STEEL

The

Metalworking Weekly

AUGUST 15, 1960

A PENTON PUBLICATION

New Missile Steel Is 50% Stronger; May Double Range of Polaris

The Magic of Magnetism Forms, Coins, and Heat Treats Metals

Russia Improves Its Machine Tools

The Fight for the Consumer's Dollar

Appliance makers, like many hard goods manufacturers, are worried about the trend of the consumer to spend less of his income on their products. B. A. Chapman, Kelvinator's executive vice president, blames the concept of the annual model change for part of the problem. Others see the trend being checked only by radical product changes. Page 45

MATERIALS EFFICIENCY

Look What New Materials Can Do

No. 17 in STEEL's Program for Management

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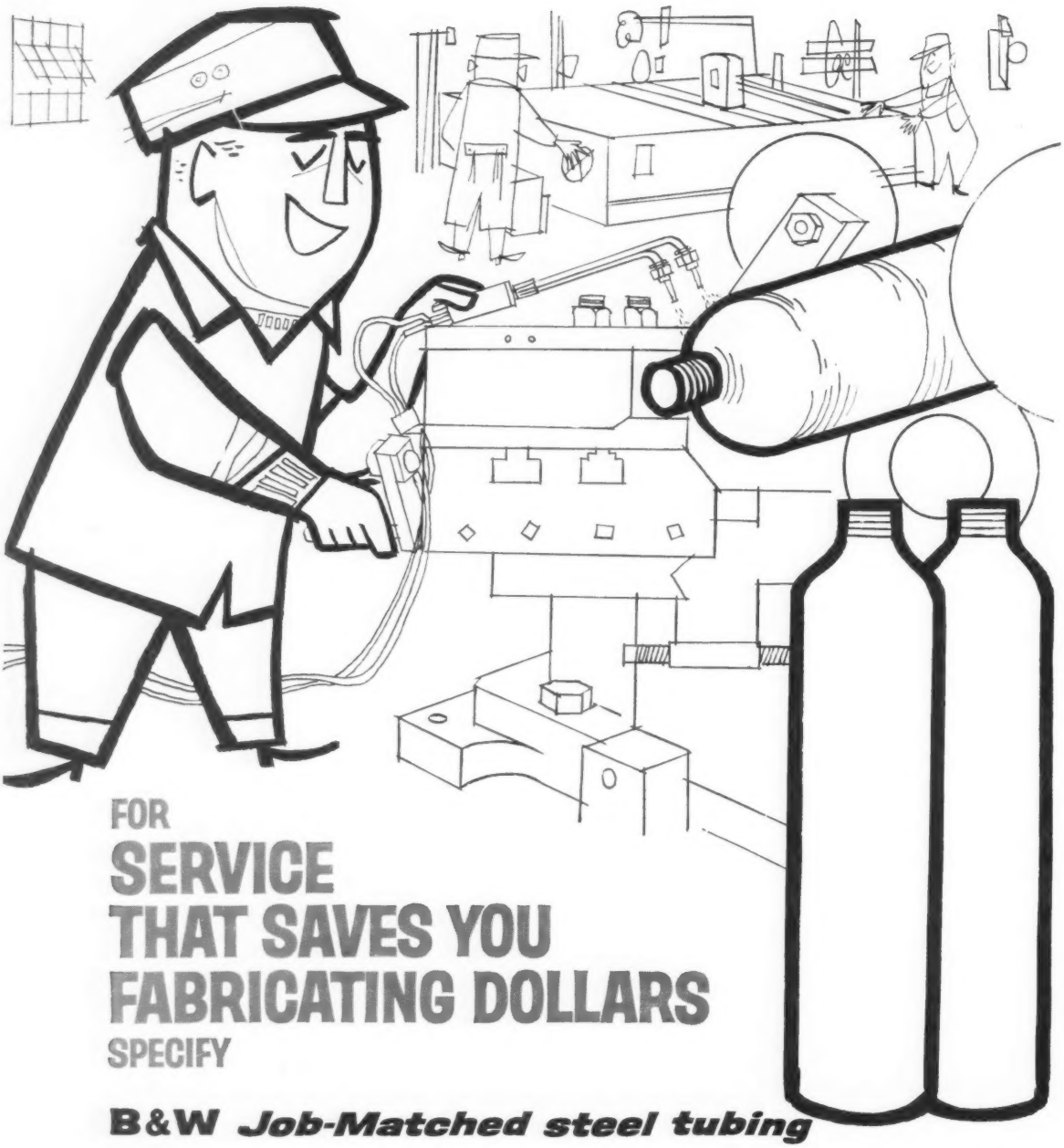

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Service is just one of the many reasons why it pays to specify B&W Job-Matched Tubing. And remember—matching tubes to jobs assures you the *right tube,* in the *right quantity,* at the *right time.* For more information, call your local B&W District Sales Office, or write for Bulletin TA-9073. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

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Steel

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Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

This Week in

STEEL The Metalworking Weekly

August 15, 1960 Vol. 147 No. 7

New Steel May Double Missile Range

Rear Adm. W. F. Raborn, who heads the Polaris program, may have had a weight saving, high strength steel — Rocoloy 270 — in mind when he predicted that the missile's range would jump from 1200 to 2500 miles within four years. The new missile steel was developed at Mellon Institute, Pittsburgh. To measure the metal's ability to withstand pressures in several directions, researchers test ellipsoidal shapes hydrostatically. PAGE 51

Look What New Materials Can Do for You

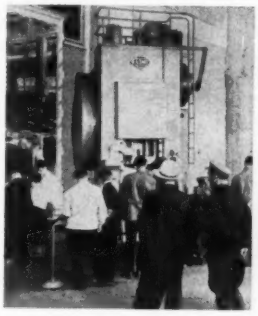
Here's your chance to read up on why new materials, like wonder drugs, are needed to cure special ills or improve over-all corporate health and how to go about finding them. You can also take a look at some of the areas where new materials promise big benefits to metalworking. The story—No. 17 in STEEL's Program for Management for 1960—starts on PAGE 55

Magic of Magnetism Applied to Metalworking

One of these days you will be able to perform such metalworking operations as forming, coining, machining, heat treating, and possibly cutting and gouging through the magic of magnetism. At least three research firms and four aircraft companies are engaged in development work on electromagnetic forming. It's another high energy rate forming technique. PAGE 80

Soviets Push Machine Tool Industry

In Russia, the State Planning Commission is being urged to make changes in machine tool production so that each plant can achieve a greater degree of specialization and speed automation, reports Richard E. Stockwell of Avco Corp., Cincinnati. Significance: It would make Russia a formidable competitor in the world's machine tool markets. Mr. Stockwell has toured Russia twice, engages in continuing research into Soviet affairs. The photo was taken at Moscow's Machine Tool Pavilion. PAGE 82



Titanium Sales Perk Up

Titanium mill product shipments climbed to a record in 1957, then dropped to less than half that total the next year as the defense emphasis shifted from manned aircraft to missiles. Producers are finding new applications in both military and commercial products, and the outlook for the strong, light metal is improving. PAGE 119

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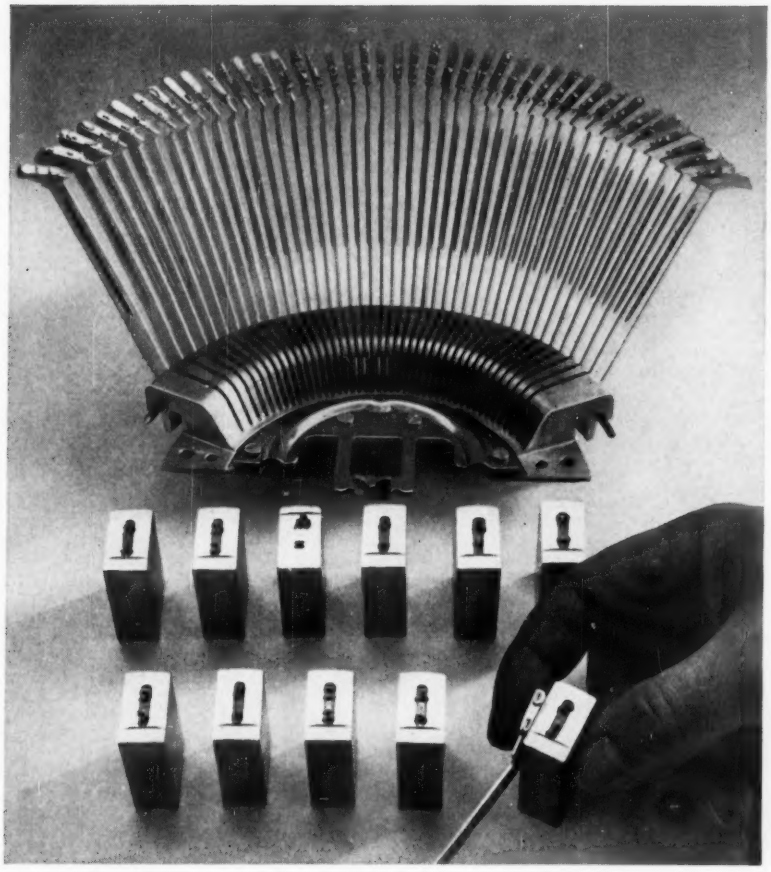
Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation



IBM makes 200 per cent more type slugs per matrix with Bearcat Tool Steel

Talk about enthusiasm! At the Lexington, Ky., plant of International Business Machines Corp. they have good reason to sing the praises of Bearcat tool steel. Recently, production of type slugs per matrix was improved 200 per cent by changing to a die made of Bearcat. The die "kneads" raised letters of the alphabet into steel slugs.

Bearcat is best known for its remarkable shock-resistance. In this instance, the manufacturer also reported better resistance to wear, and easier machinability (as compared with the tool steel formerly used).

Bearcat is our super grade of shock-resistant air-hardening tool steel. It's ready and willing to handle the toughest shock applications. Because it's an air-hardening steel, Bearcat minimizes both quenching hazards and distortion in heat-treatment.

Like to try Bearcat? Telephone your Bethlehem tool steel distributor.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

TOOLS can be repaired by welding if the proper procedure is used

To incorporate design changes or repair, all tools and dies made of tool steel can be welded successfully if the following procedure is observed:

1. Full-anneal the tools. Good atmosphere control is necessary to avoid scaling and decarburization of the working surfaces.

2. Prepare the crack for welding by "veeing" its full depth and length. Magnetic particle inspection is advisable.

3. Use a welding rod which will deposit steel of the same composition as the tool.

4. Preheat to 400 F - 800 F, and maintain this temperature during welding.

5. Clean the slag from each bead before proceeding with the next bead.

6. Immediately after welding, transfer the tool into a warm furnace (400 F min) and full-anneal.

7. Machine or grind the weld to the desired tool dimensions.

8. Heat-treat the tool by quenching and tempering to the desired hardness, using the standard procedure for the grade involved.

9. Grind the tool working surfaces. The depth of metal removal will depend upon the amount of decarburization produced in Steps 1, 6, and 8.

The use of this procedure will permit the successful welding of tools if it is essential that welding be done. In the majority of instances, however, it will be found both cheaper and quicker to make up new tools.

When emergency welding is done on a production line, it is often necessary to eliminate many of the steps mentioned above, thereby reducing the chances of producing successful welds.

STEELWELD PRESS BRAKE CUTS FORMING COSTS

Fast Two-Step Operation Speeds Trolley Duct Production

MMT-PE

Booth 814
Machine Tool
Exposition

ELECTRIC trolley duct is turned out at a high rate on a Model K5-10 Steelweld Brake. The machine is fitted with removable bed and ram brackets to provide the width necessary to support two sets of dies. The front dies flange both sides of steel strips. The rear dies form the flanged strips into ducts. Thus, with each stroke of the ram, two operations are performed and a trolley duct completed. As many as 20 ducts can be produced per minute, which is the speed of the machine.

Two men normally work at the press, and each is provided with a set of control buttons. As a safety measure, two "run" buttons, requiring both hands of the two men, must be depressed to operate the machine.

This machine has air-electric control which eliminates the need of any cross shafting at front for mechanical foot treadles. Air-electric control makes push-button operation possible and provides fast, positive clutch and brake action.

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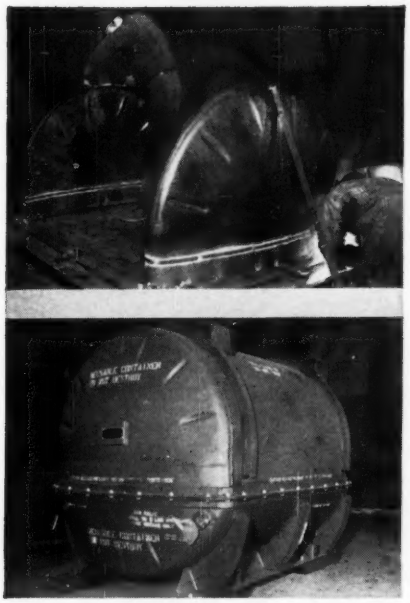

SMOOTH, ACCURATE FLANGE of COMMERCIAL heads is used as fitting up template and welding fixture in applying shell wrapper. Note embossed ribs giving heads added strength.

COMMERCIAL tank heads are important components of reusable containers fabricated by the New Castle Welding & Mfg. Co. of New Castle, Pa. for storage and shipment of army tank engines.

Built-in "bench marks"— Since containers are pressurized, humidity-controlled, and rugged enough to survive 5-foot free fall with motor weighing 3700 lb. mounted inside, it was imperative for tank heads to fit snugly—integrate smoothly. In fact, the precision uniformity of the flanges of COMMERCIAL heads serve as gauges for fitting the wrapper sheet, speed assembly, make welding easier and faster.

Head details— Engine container heads were custom-made (60" long diameter, 11 gauge QQ-S-640 steel, 1½" straight flange) by COMMERCIAL to rigid specs. COMMERCIAL engineers also designed the embossed ribs on the heads for greater impact resistance. With over 30 years experience and ingenuity in cold forming of steel, COMMERCIAL produces heads with improved metal quality in presses up to 2000-ton capacity. Three plants—Youngstown, Chicago, Salt Lake City—strategically located in important steel producing centers, are keyed to expedite your order.

For fast delivery—COMMERCIAL offers standard heads from stock made with a complete range of solid dies in all standard sizes from 12" to 72" O.D., in all popular gauges up to ½" thickness. Heads can be furnished for code or non-code pressure vessel construction from steels to meet the required specifications. Types furnished include flanged and dished, ellipsoidal, hemispherical, flanged only, double dished and obround. For full information on heads in stock for immediate delivery, write to Commercial Shearing & Stamping Company, Dept. L-34, Youngstown 1, Ohio.

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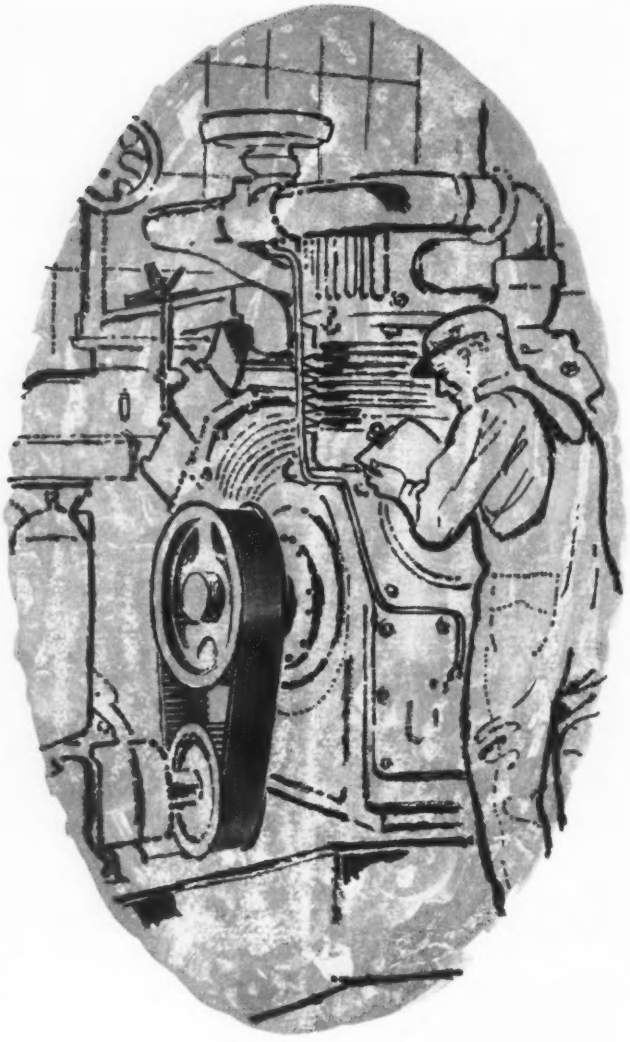
give you positive power transmission without slip



If you have a problem drive that has defied all efforts at effective, slippage-free belting—here's your answer.

It's the new P. D. (Positive Drive) Belt—from the G.T.M.—Goodyear Technical Man—and his colleagues. And it gives you the near-100% efficiency of a fine gear drive—guaranteed by the extra-quality construction for which Goodyear belts have long been known.

P. D. Belts will not slip—even under high-torque, heavy shock-load conditions. Credit for that belongs to the integrally molded teeth of special Goodyear synthetic rubber compounds—teamed with load-carriers of airplane-type steel cable.

With dimensionally stable construction like this, usually no take-up is necessary. In fact, high tension isn't required—even initially. So bearing loads are lighter—bearing life, longer. And with no metal-to-metal contact, no lubrication is necessary.

So it's easy to see why so many outfits are converting drives to this new, more accurate kind of power transmission. It's the same reason so many present tooth-belt users are scheduling P. D. Belts by Goodyear for their next replacement. They know they can get a reliable recommendation from a real belt expert, the G.T.M.

For complete specs on P. D. Belts for drives up to 600 h.p. and for speeds over 10,000 f.p.m., contact him through your Goodyear Distributor — or by writing Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

"P. D."—
POSITIVE DRIVE
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Goodyear Positive Drive Belts are manufactured under license and according to U. S. Patents 2,507,852 and 2,397,312

P. D.—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Appliances Miss the Mark

This week, Pittsburgh Resident Editor Bill Wallace gives you a look at the appliance industry. Sales figures haven't hit the target that appliance makers shot for earlier this year. Bill delves into the reasons for the deviation.

Backing his effort is a question and answer article developed by Detroit Resident Editor Don Postma with Bernard Chapman, executive vice president and general manager of American Motors Corp.'s Kelvinator Div., Detroit.

Mr. Chapman is our cover personality this week. Here you see the back of his head and a front view of Don as he listens to Mr. Chapman tell this tale:

Stealing Aid and Aiding STEEL

"When I was attending the University of Detroit back in 1930, I also was active in editing and publishing a student engineering magazine, *Co-ord* (for co-ordinate). One day, I ran across a beautifully illustrated story about a process in STEEL. I wrote to STEEL, got a copy of the print, and ran it. In my excitement, I forgot to credit the source.

"A few months later, your editor (the late Earl Shaner) sent me a nice letter. How he got hold of a copy, I'll never know. (We read everything, Mr. Chapman.) In effect, he was gratified we'd thought enough of STEEL's story to use some of the material. He gently mentioned that he would have appreciated it even more if we had credited STEEL. As he put it: 'In that case, you would have been aiding STEEL, instead of stealing aid.'

"I was naturally a bit chagrined and properly apologetic. Nonetheless, I certainly haven't forgotten STEEL."

All is forgiven, Mr. Chapman. Besides, the statute of limitations has run out.

Testing Without Touching

"Congratulations for the item 'Atom Age Tester' in your July 18 Technical Outlook. Your notation of this advanced method of testing alloys is the first I have seen in a trade publication," writes Dr. Ernest H. Wakefield, president and director, Radiation Counter Laboratories Inc., Skokie, Ill.

"Neutron activation is a most ingenious way of nondestructively testing material without physically touching the material. It is being investigated in aluminum smelting for determining the ratio of oxygen and fluorine; in the beryllium metal field for determining oxygen content; and, of course, the oil industry has long been a user, particularly in analysis of catalysts."

Laying Track

The vacation season really slugs a publishing company. Regular schedules are tougher to meet. Combine juggling a vacation schedule with trying to get out three special issues and you get a picture of editors who look like men frenetically laying railroad tracks in front of a locomotive that's thundering down on them at 90 mph. If it hadn't been for editorial planning that started a year ago, we would be riding the cowcatcher by now. Watch for the issues. They promise to be books to treasure.

A Private War on Costs . . .

. . . is paying off for Emerson Electric Mfg. Co., St. Louis. A case study, based on the company's profitable attacks, started on its way to becoming next week's cover story when Associate Editor George Howick checked the business pulse in

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St. Louis three months ago. He was city hopping in our coast to coast air safari and got opinions from executives at Emerson Electric.

He also uncovered (and later wrote) this cover feature . . . Last year, cost reduction through product redesign contributed 34 per cent of the company's net profit. Slashes at other costs helped the company stash away nearly as many dollars in the till.

More refined management tools than an ax were wielded in the chopping. Solid organization, goal setting, controls, automation, and top thinking talent gave the diversified electric equipment producer a program for success that almost any company would like to emulate.

Can yours? See next week's article, "How to Take Costs Out of Your Products."

A Cordial Note . . .

. . . arrived the other day from Allan L. Frew, winner of our May Usership contest. It reads: ". . . I personally, and we as a company, are indeed grateful to STEEL. The $500 I received is not to be sneezed at. However, the benefit received by our company (Waterbury Buckle Co., Waterbury, Conn.) because of the action taken as a result of an article in your magazine, should help us even more . . . particularly at a time when all costs must be carefully watched. Your contest is a good thing . . . it precipitates interest in the minds of metalworking people to do something about solving production problems."

You Can Win $1000 This Month

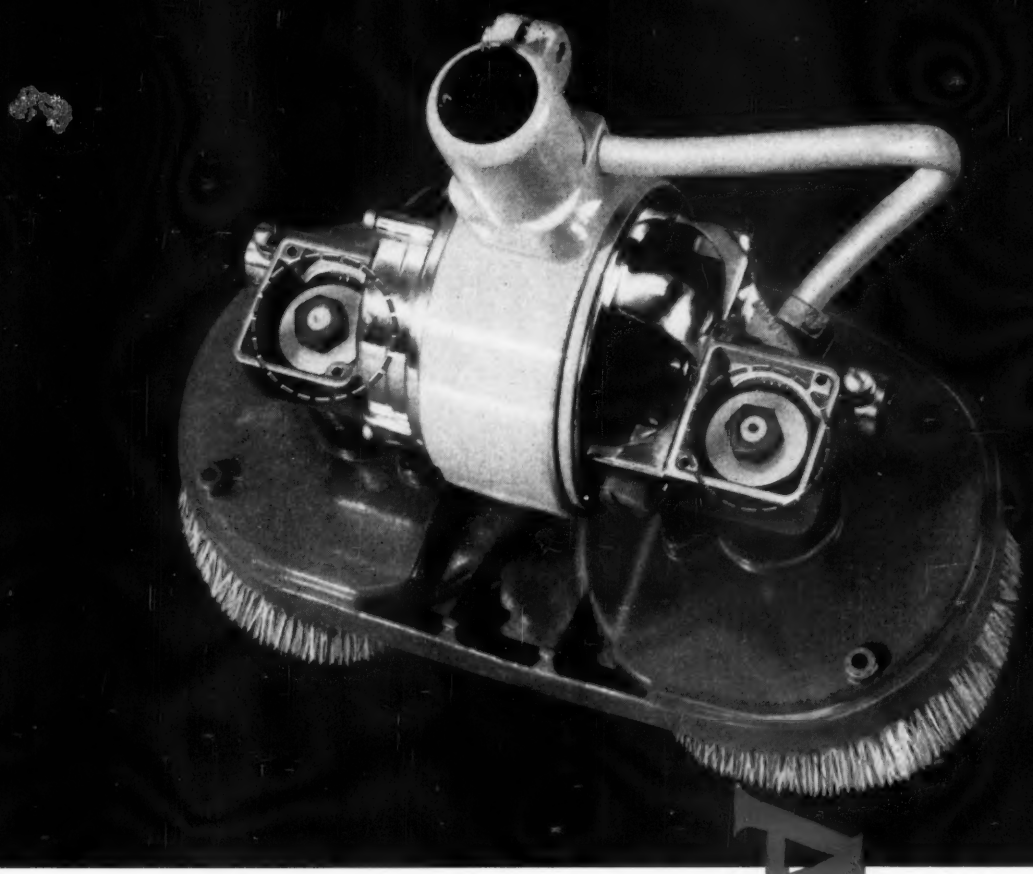
There are five issues of STEEL this month—and one could help you win $1000 in our Usership Idea of the Month Contest.

Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—August, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—you will win $500.

There's more . . . You will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You may enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. Deadline for this month's contest is Oct. 1.



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Continuous cast Asarcon 1010B has unique wearability under tough conditions, outlasting conventional gear bronze in performance by as much as 35%! It is an easy machining alloy, allowing higher speeds and feeds, fewer machining and finishing operations, reduced tool wear, and greater production per tool change.

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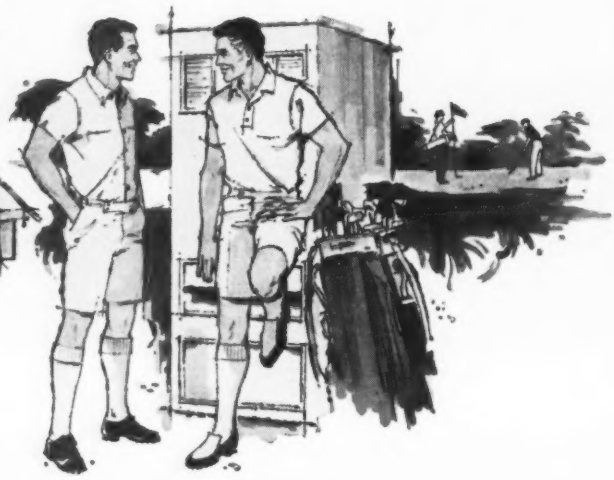
Takes the paint

that's why Choice Vend



This STEELMARK of the American Steel Industry tells you a product is made of steel. Look for it when you buy. Place it on the products you sell.

FINAL ASSEMBLY OPERATION. Choice Vend Division, Seeburg Corp., Hartford, Connecticut. Before assembly, parts receive a primer coat and an infrared baked-on finish coat of paint. Electro Paintlok's superior paint-gripping characteristics insure a tight bonding of paint to metal, and its smooth, non-spangled surface helps achieve a lustrous, attractive painted finish.

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The modern straight-line design of Choice Vend's soft drink vending machines makes them attractive in any setting. How to keep them that way was the problem, since machines placed in public locations are subject to all kinds of bumps and knocks.

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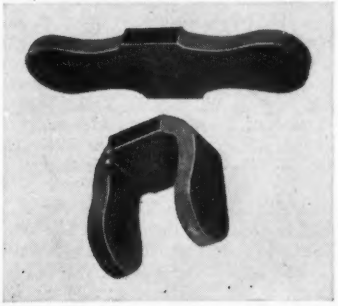

RUGGED STRENGTH FOR PTO UNIVERSAL JOINT YOKES. Republic Type "M" High Strength Steel provides Alofs Manufacturing Corporation, Grand Rapids, Michigan, with a better, lower cost way to make tractor universal joint yokes. The part is stamped from ⅜" x 1½" Republic "M" High Strength Steel, and formed into a U shape. Result: important manufacturing savings over the previous manufacturing method, plus the toughness to withstand severe strain and impact. For more data on Republic High Strength Steels (offered in Types "M," "50," "65," and "70") send the coupon.

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The test shown above, in which a razor blade is drawn sharply across a Jomac glove without ill effect, shows the remarkable cut resistance of Jomac's loop-pile fabric . . . *protection that even leather doesn't afford.*

Moreover, Jomac gloves *wear longer* than leather gloves and provide a *better grip* on oily surfaces. And most Jomacs—like the HR gloves shown above—are reversible . . . so any two make a pair, any pair gives you four working surfaces.

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CALENDAR OF MEETINGS

Aug. 15-17, American Society of Mechanical Engineers and American Institute of Chemical Engineers: Heat transfer conference and exhibit, Statler-Hilton Hotel, Buffalo. Information: ASME, 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Aug. 16-19, Society of Automotive Engineers Inc.: National West Coast meeting, Jack Tar Hotel, San Francisco. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Sept. 3-4, American Machine Tool Distributors Association: Annual meeting, LaSalle Hotel, Chicago. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Sept. 6-16, National Machine Tool Builders' Association: The Machine Tool Exposition — 1960, International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Sept. 6-16, Production Engineering Show: Navy Pier, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Sept. 7-9, American Society of Mechanical Engineers: Instruments and regulators conference, Massachusetts Institute of Technology, Cambridge, Mass. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Sept. 7-15, Coliseum Machinery Show: Coliseum, Chicago. Information: A. Byron Perkins & Associates, 2807 Sunset Blvd., Los Angeles 26, Calif.

Sept. 12-13, Industrial Truck Association: Fall meeting, Cavalier Club, Virginia Beach, Va. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

Sept. 12-15, Society of Automotive Engineers Inc.: National farm, construction, and industrial machinery meeting; production forum; and engineering display, Milwaukee Auditorium, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Sept. 13-15, American Chemical Society: Fall meeting and exhibit, Statler-Hilton Hotel, New York. Society's address: 1155 16th St. N.W., Washington 6, D. C. Executive secretary: Alden H. Emery.

Sept. 13-16, Electronic Industries Association: Fall meeting, French Lick-Sheraton Hotel, French Lick, Ind. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

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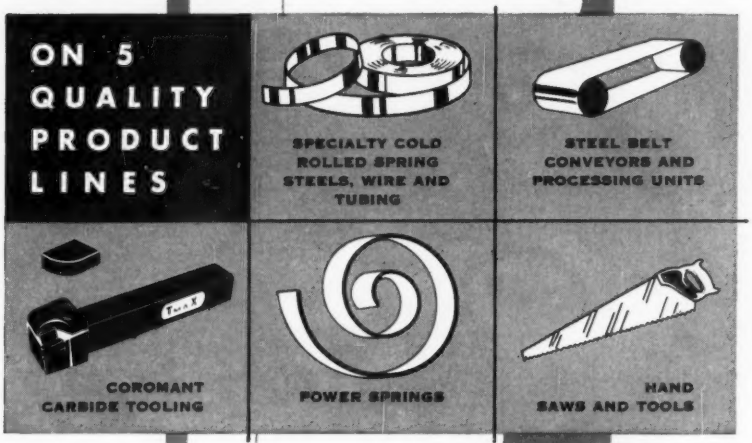
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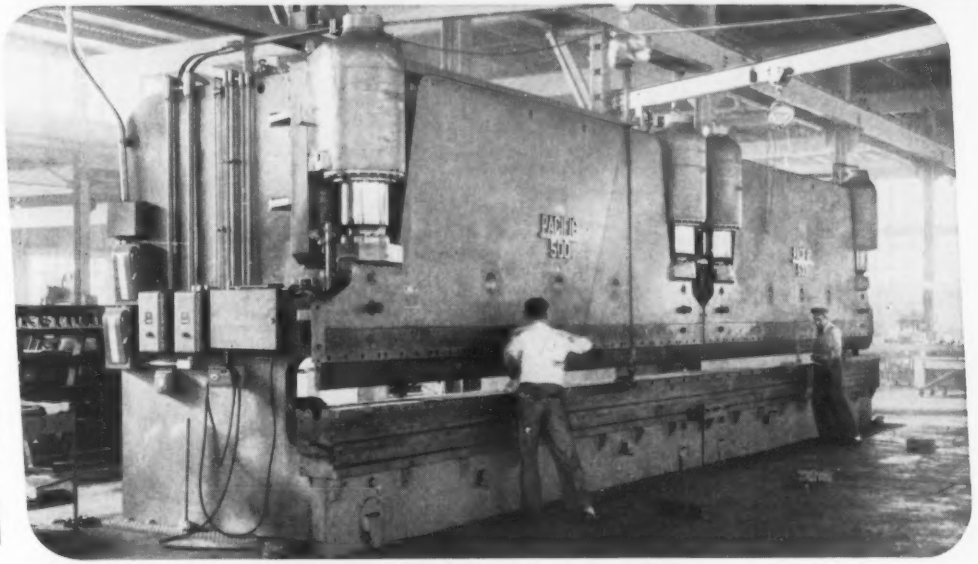

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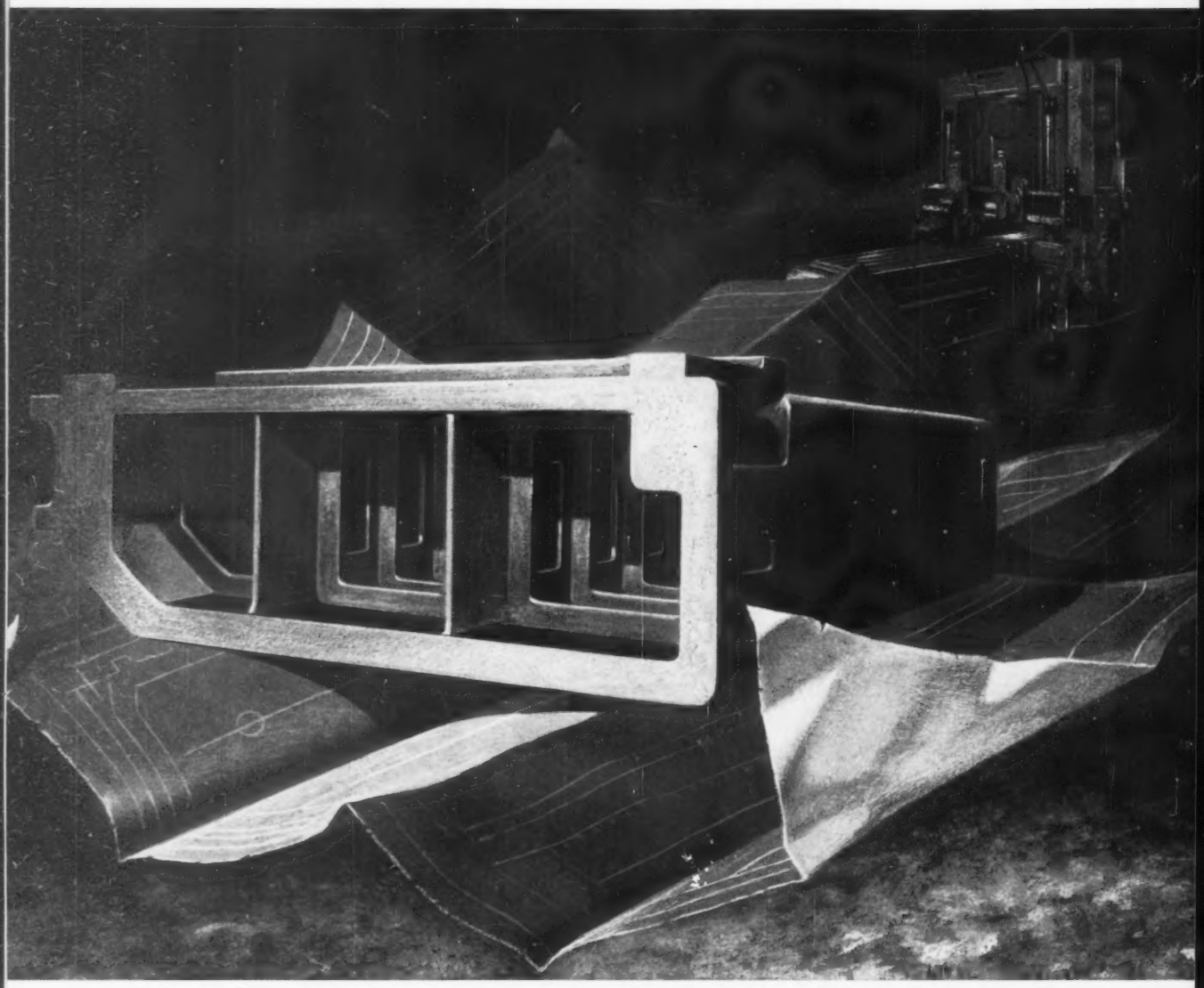

EVEN ON A SHORT RUN, IRON CASTINGS BEAT FABRICATING COSTS BY $2,984

Originally the right- and left-hand columns for this new heavy-duty planer were designed for weldments at a cost of $10,400 each. However, the blueprints indicated some difficult-to-weld elements. So, despite the fact that there was only a short run of two orders, the cost-saving possibilities of gray iron castings were thoroughly explored.

The cost of making sectional core boxes for both the molds and the cores came to $7,000. With the co-operation of the foundryman and pattern maker, they were made reversible to obtain either a right-hand or left-hand casting. The total production cost for two pairs of the 16,900-lb. gray iron castings, including patterns, came to only $17,816 vs. $20,800 for welded columns . . . a measurable savings of 14.3%.

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Facts from files of Gray Iron Founders' Society, Inc.

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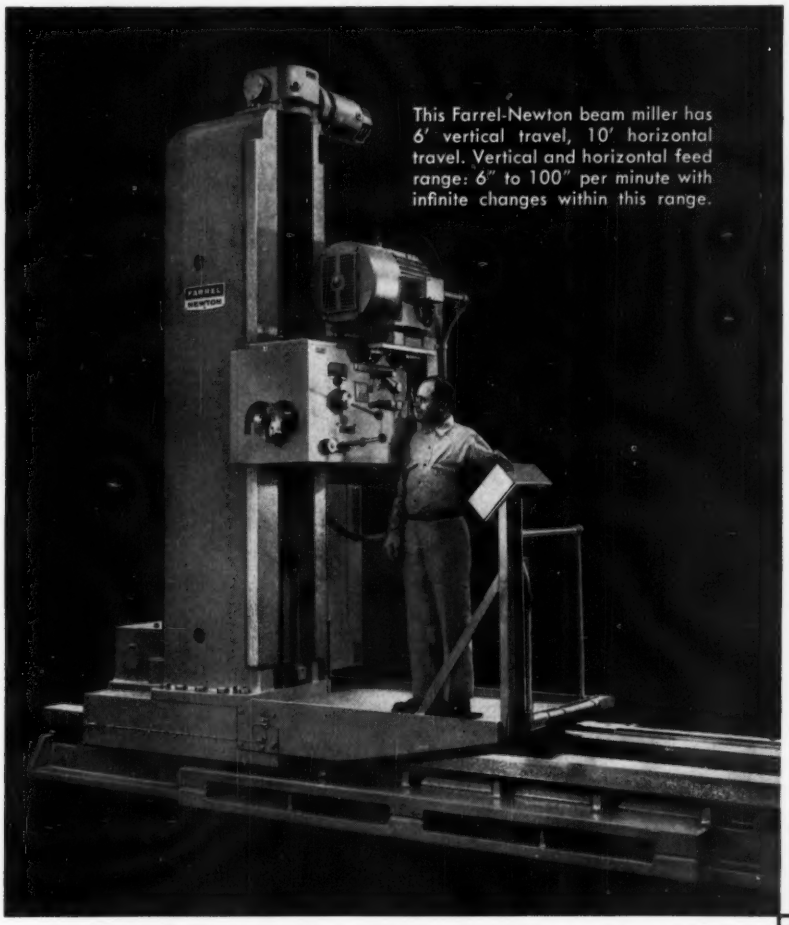

This Farrel-Newton beam miller has 6′ vertical travel, 10′ horizontal travel. Vertical and horizontal feed range: 6″ to 100″ per minute with infinite changes within this range.

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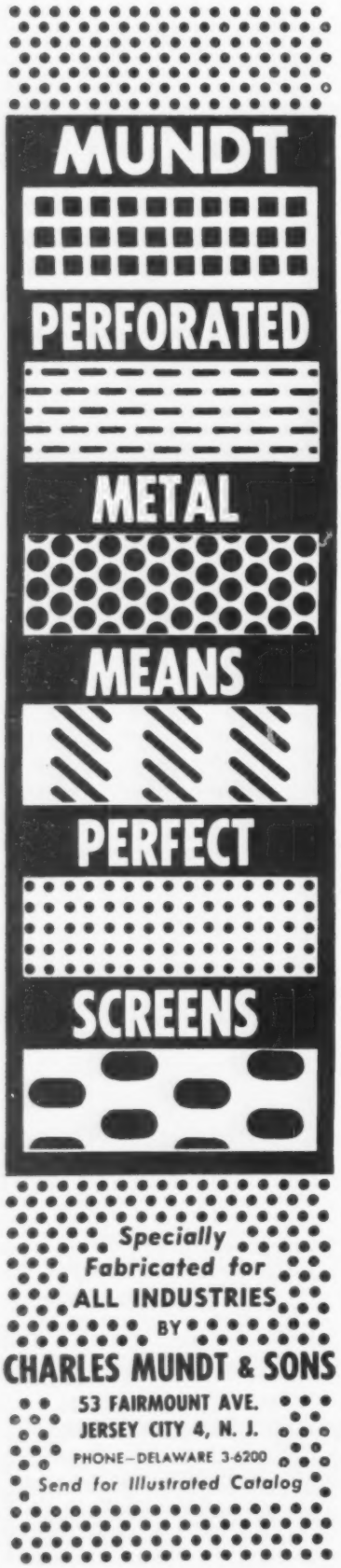

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AUGUST, 1960
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NATIONAL CARBON COMPANY'S

CARBON AND GRAPHITE NEWS

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LUKENS STEEL COMPANY'S ELECTRIC FURNACE

a year of operation proves our decision was wise!

L. P. McALLISTER

LUKENS STEEL ELECTRIC

a year of operation proves

L. P. McALLISTER
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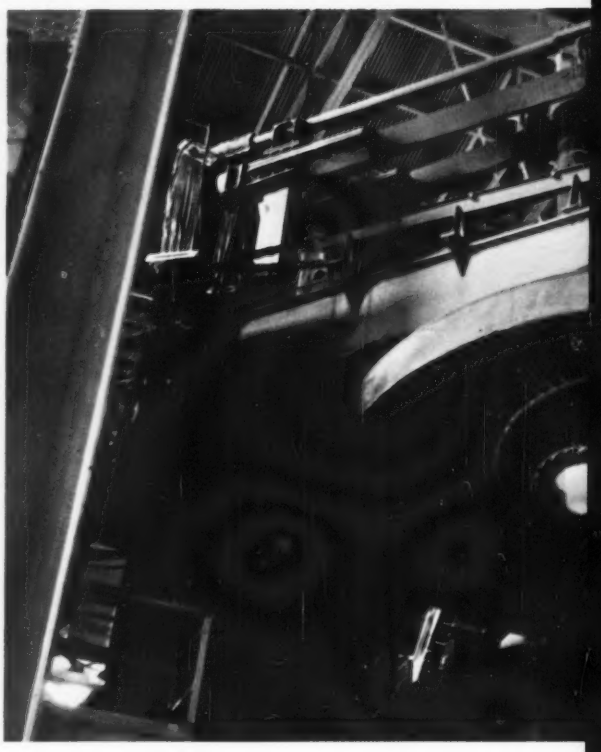


After a year of operation, the 100 ton electric furnace has proved to be an efficient, economical, and flexible tool for our steelmaking program. The installation was made after years of investigation into the type of equipment which would best serve our needs. After working with this equipment, we have found that the electric furnace is all we predicted it would be and in many instances its performance far surpasses our predictions. The major advantages we have realized with the electric furnace are:

- *LOWER FIRST COSTS*
- *LOWER PRODUCTION COSTS*
- *INCREASED OUTPUT*
- *FASTER HEATS*
- *FLEXIBILITY OF PRODUCT PRODUCED*
- *FLEXIBILITY OF OPERATIONS*
- *LOWER MAINTENANCE COSTS*

Introduction

For many years, Lukens Steel Company has invested large sums of money in expansion and improvement programs in order to meet the challenge of a highly competitive industry that constantly changes because of technological developments. The advances have brought Lukens step by step from a company that was built on the banks of the Brandywine 150 years ago by Isaac Pennock, to a company that today is an inspiring example of the best American tradition in the production of iron and steel.

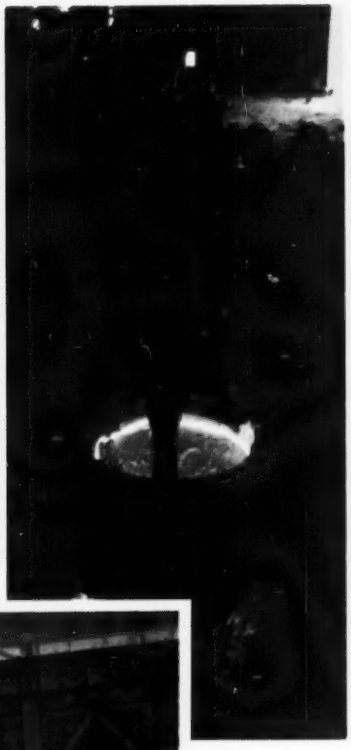
Some of the changes we have made since our early days were minor and some were major in nature. As recently as July 1957, ground was broken for the largest single expansion program in our company's history. When the program was completed in April 1959, we had invested roughly 33 million dollars in steelmaking, heating, and rolling equipment. Approximately 12 million dollars of the total applied to a 100 ton top-charge electric furnace plus accessory equipment and building. The remaining 21 million dollars covered installation of a four-high 140 inch slabbing mill and added heating capacity and expanded finishing area.

This expansion program raised our ingot-making capacity by 24 per cent from 750,000 ingot tons a year to 930,000 ingot tons; the new slabbing mill increased rolling capacity of the combined mills by approximately 40 per cent.

Any company planning a major expansion program such as this would naturally be as thorough as possible in investigating approaches that add up to a sound, efficient and economical solution. Actually, our needs could

COMPANY'S FURNACE...

our decision was wise!



best be answered by adding one of two types of steel-making equipment, the open hearth or the electric furnace.

Having been associated with open hearths for a long period, we knew from experience primarily what to expect from this equipment and also knew its limitations. We were not familiar with electric furnace operations at all. This subject required very close investigation before a decision could be reached. And, only after years of intensive scrutiny did we decide that the electric furnace best suited our needs from both an economical and production standpoint.

In this article, I shall relate some of the reasons why we chose the electric furnace . . . our basic thinking and predictions prior to installation . . . and finally, the results we have realized after a full year of electric furnace operations.

ADVERTISEMENT

Electric Furnace or Open Hearth Capacity

We at Lukens spent several years investigating the type of ingot-making equipment which we would eventually install to meet the increasing demands of our expanded markets. A committee, comprised of personnel from our operating, metallurgical, engineering, and accounting departments, approached the task of investigating this subject thoroughly.

As was mentioned previously, we have had many years of experience with the open hearth furnace. We knew that added capacity utilizing this equipment would naturally involve purchasing additional high-priced iron on the open market. With this in mind, we considered the possibility of installing a cupola in our plant to produce our own hot metal.

At approximately the same time, we started to examine the electric furnace closely. Some of our committee visited plants utilizing electric furnaces to gain first-hand knowledge of their operations, practices and experiences. They talked with furnace manufacturers, with accessory equipment manufacturers, with electrode producers, and others, in an attempt to collect as much data as possible to help make a sound comparison between the electric and the open hearth furnace.

A Survey was Conducted

An intensive survey was conducted covering the major factors that would help guide us in our decision. In all cases, actual figures were gathered and plotted covering these subjects for the length of time required to establish a trend. In some instances this covered a period of fifteen years. The data were then projected to apply to the future.

Some interesting factors were derived from this survey material. One is the estimate that in the future there will be a favorable spread between the cost of iron and scrap in the industry. Also, the electric furnace in relation to the open hearth, offers a higher scrap to iron ratio, offers higher yields and provides improved costs for metallics.

Based on our studies and surveys, a report was submitted to top management recommending the installation of an electric furnace. The recommendation included the following predictions based on the installation of a 20′ diameter shell, 100 ton top-charge electric.

- Investment in an electric furnace and building would be considerably less than equivalent open hearth capacity.
- Costs per ingot ton of electric furnace steel should be favorable.
- Heats could be made faster.
- The electric would offer flexibility of product and operating schedules.
- Maintenance costs would be reduced.

Results After a Year

After a little more than a year of operation, we find the electric furnace has done all we predicted it would do and in some instances it has surpassed our expectations. The results show our original decision was wise. The major advantages we have realized with the electric are numerous. They will be covered not necessarily in order of importance, but as they come to mind.

Costs

Our entire investment in the electric melt shop was roughly 40% less than it would have cost to install the equivalent open hearth capacity.

After the break-in period, during which time we had very few de-bugging operations, we find we have been able to achieve and even better our cost goals compared to existing open hearth practices.

Production

A most dramatic feature, of course, is the production we have realized with the electric furnace. With our 100 ton unit we are producing the rated 20 tons per hour. This has been achieved with only a year's experience on new equipment. Our average output with 135 ton cold charge open hearths runs about 9½ tons per hour tap to tap. Not only is output of our electric running at more than twice

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that of the open hearth, but in addition, the man hours required per ton of steel produced in the electric run roughly 60% less than required with the open hearth. Over the next few years, as we gain added experience with the electric, we naturally expect to raise our tonnages per hour output.

Flexibility

Another feature of the electric furnace is the flexibility and versatility it offers for our operations. We can produce electric steel according to demand by running the arc furnace any number of shifts and any number of days per week. Presently, we are producing approximately 70% carbon and 30% alloy steels. We have also gained flexibility in our choice of charge materials. We average 3% iron charged in electric melting operations, although we are making some heats without any iron at all. Compare this with our open hearth practices where at least 30% high-cost iron must be charged in every heat.

Also, the electric permits us to consume larger quantities of home produced alloy scrap. This means we can recover valuable nickel and molybdenum that would otherwise have to be purchased on the open market.

Fast Heats

We feel that the melting speed of the electric furnace is another dramatic feature. On carbon heats, the average heat cycle in our electric is 4 hours and 30 minutes charge to tap. It is 5 hours and 20 minutes tap to tap. The latter figure allows for any minor maintenance between heats. Initially our heat weights in the electric were running 100 tons per heat. In the short period of one year we have raised this figure to 108 tons per heat.

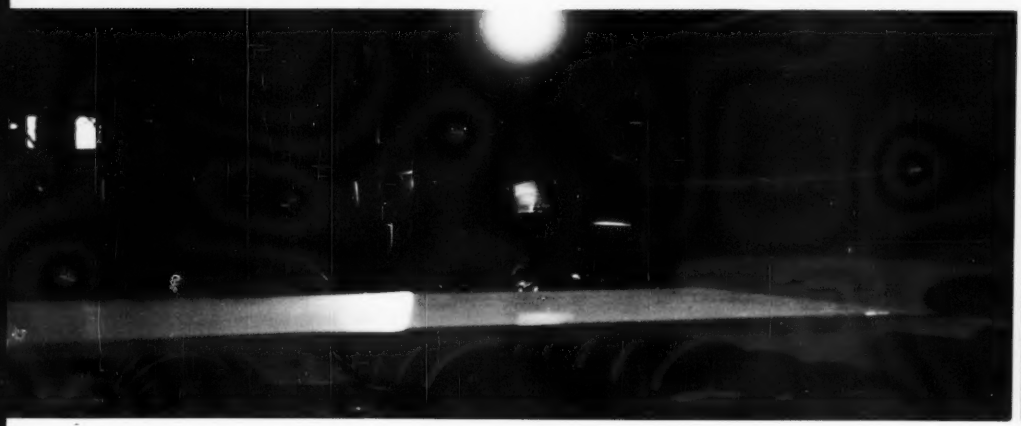
Maintenance

We can completely reline our electric in approximately 16 hours. Naturally, this reduction in down-time for maintenance and repairs has reduced overall operating costs. In addition, it is our experience that the electric maintains a high level of output throughout the life of the lining, whereas our open hearths begin to drop off in production toward the end of each furnace lining campaign.

Some details of our electric shop experience may be of interest. We made the change-over with basically our open hearth crews, except for two electric furnace melters hired from outside the company. Our open hearth men trained for four weeks at a steel plant experienced in electric steel operations, and then joined our two electric melters to train first and second helpers. Presently, all the personnel working in the electric melt shop are from our open hearth department. These men became skilled in electric melting practices rapidly considering the differences encountered in melting practice.

Looking to the Future

As I remarked previously, we at Lukens feel we made a wise decision when we installed our electric furnace. And, the record of this ingot-making tool backs up our decision. Considering the scope of the change-over, authorities in the industry tell us our transition period was remarkably smooth with a minimum of major problems. A share of the credit goes to the Lukens' personnel who worked so diligently to achieve this installation and to those who contributed to the successful operation of the electric furnace. Also, we would like to thank and praise our elec-



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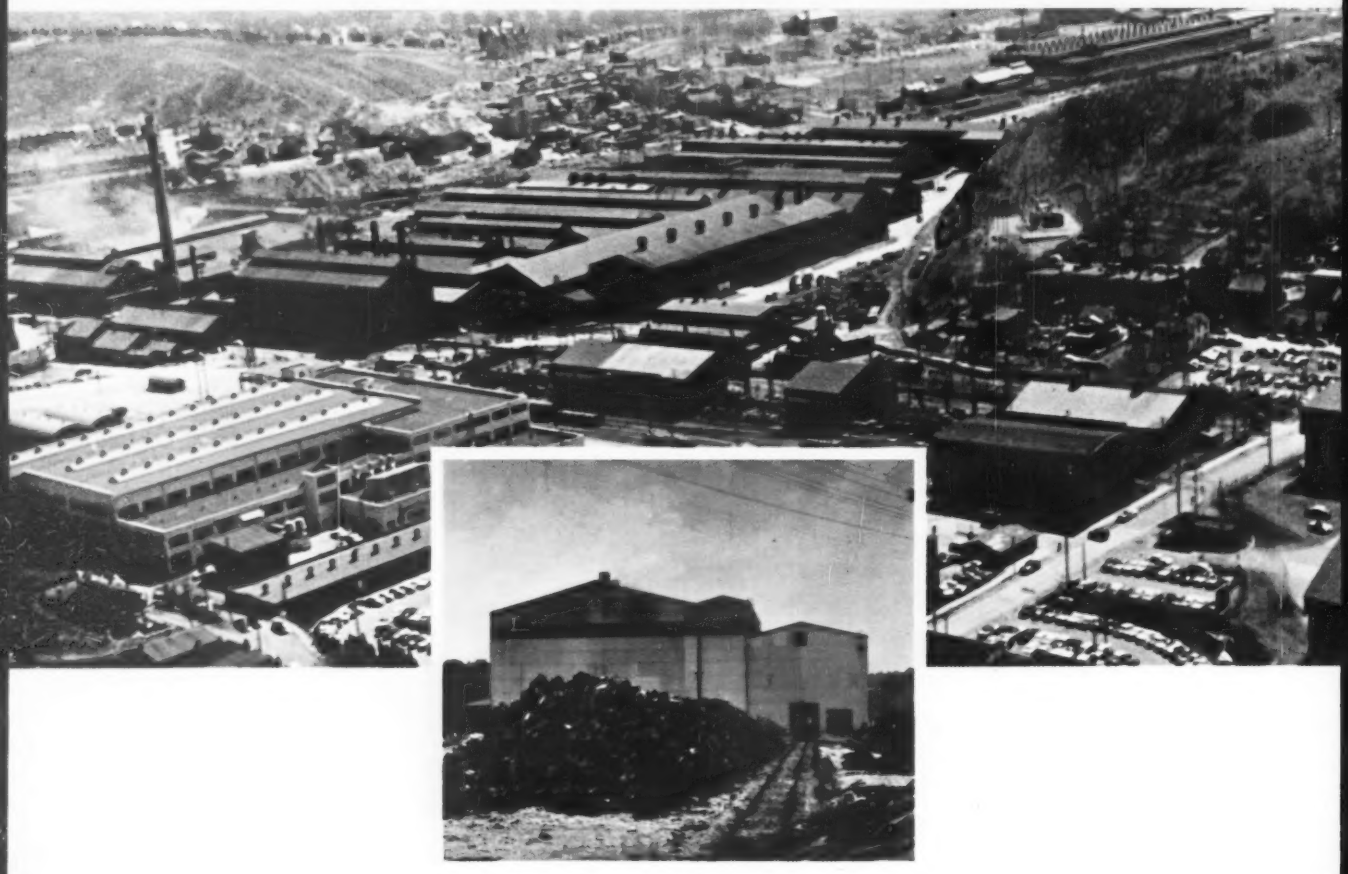
tric furnace suppliers who started us off in the right direction and, therefore, helped us avoid some of the pitfalls associated with a transition of this type.

Based on our experience, we feel that today's electric furnace is a highly efficient and economical production tool. We are also watching with interest the many technological advances – in a wide range of research, development, and pilot plant stages – that are bound to open vast new horizons for electric furnace steel operators. Some of these that come to mind are: the interest and activity in direct ore reduction processes, the use of oxygen in electrics, and today's practice of utilizing hot metal in the electric furnace.

Certainly, the electric furnace answers our needs of today, but it also answers the desire of Lukens' management to foresee future demands and developments and to take steps accordingly. We look forward to the time when demand will require the installation of additional electric furnace capacity. Our shop is now designed to accommodate two electrics and additional units can be installed with minimum alterations.

Planning such as this is one of the reasons why Lukens has maintained a reputation as a leader in the industry for a century and a half. From the rolling of boiler plates for 19th century river boats and locomotive engines to the production of integral parts for such wonders of the 20th century atomic age as rockets, missiles and nuclear submarines and merchant ships, Lukens has truly kept pace with the advances of man.

Our electric furnace will aid us in meeting the challenges ahead for continued growth, will help us keep pace with the stimulating competition of the industry, and will add to our ability to continue to produce "steels in step with science."



"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

Division of Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.

UNION CARBIDE

Litho in U. S. A.

Need quick delivery on ALCOA ALUMINUM FASTENERS? Pick up your phone!

It's that easy. Like calling your own stock room and having what you need sent over—aluminum bolts, nuts, rivets, machine screws, wood screws, sheet metal screws, washers, whatever your job calls for in standard sizes and types!

There's a local distributor nearby, with full stocks of Alcoa® Fasteners. He offers the largest line, the fastest deliveries.

Not to mention top quality that spells lower production costs for you. Alcoa Aluminum Fasteners offer many advantages: corrosion resistance; full threads; no burrs; fully heat-treated, high-strength alloys—and always a *full count*. You get what you pay for, every time.

Look in the Yellow Pages. Call your Alcoa distributor. Get all the light, strong, attractive, bright Alcoa Aluminum Fasteners you need. Want more information and samples first? Just mail the coupon!

ALCOA ALUMINUM

ALWAYS FASTEN ALUMINUM WITH ALCOA ALUMINUM FASTENERS

Aluminum Company of America
2001-H Alcoa Building, Pittsburgh 19, Pa.

Please send me complete specification data and samples of Alcoa Aluminum Fasteners.

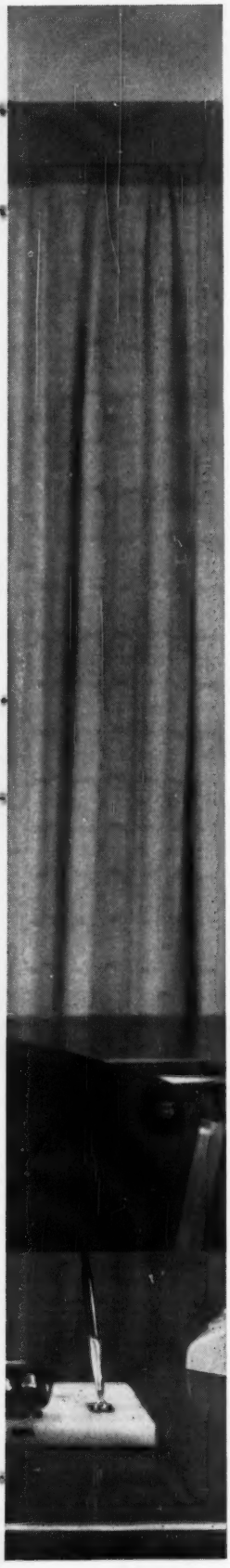
NAME_____ TITLE_____

COMPANY_____

STREET ADDRESS_____

CITY_____ ZONE____ STATE_____

THE AMPLEXOLOGIST



The Amplexologist occasionally gets more than he bargained for. But that's not bad. It's good. In fact, it's like hitting the jackpot on the 123rd try.

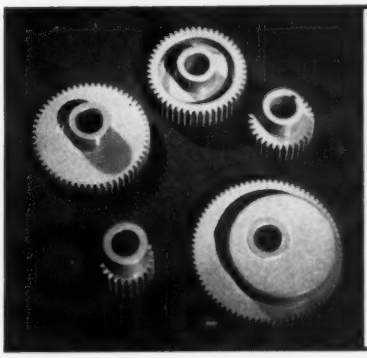
Why? Well, the Amplexologist has convinced any number of manufacturers that a few of the parts in their products can be made better and cheaper by eliminating machining costs through advanced powder metallurgy (i.e. Amplexology).

Strange to say, however, many of these same manufacturers are often hesitant about exploring the broad application of powder metallurgy to their product. Well, it takes time. But sooner or later most of them take the plunge:

O.K., Genius. Let's see how good you really are. Take all the prints for our new models. Check every one. Then you tell us how many parts can be made out of powder metal. And how much they'll cost.

You see? Jackpot. And not just for the Amplexologist. For the manufacturer, too. A cost saving jackpot . . . because he's starting when designs are still flexible to take full advantage of powder metallurgy.

Challenges like this (*"You tell us . . ."*) pay off for manufacturers and for us. They have in fact, helped make us the world's largest and most experienced producer of powder metal parts. Another reason why leading manufacturers say: **When it comes to powder metallurgy —Amplex has the answer.**



"You tell us . . ."

The parts shown are a new gear train: driver gear, high and intermediate speed driven gears, low speed gear, pinion gear. These five parts plus ten more were selected by the Amplexologist—who was called in at the design stage—for powder metal production. All are finished precision parts which require no machining (except the helical gear). Estimated savings on the gear train, 86%.

AMPLEXOLOGIST

SEND COUPON **. . . if you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.**

AMPLEX DIVISION • CHRYSLER CORP. • Dept. S-8
P.O. Box 2718 • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

NAME_____

COMPANY_____

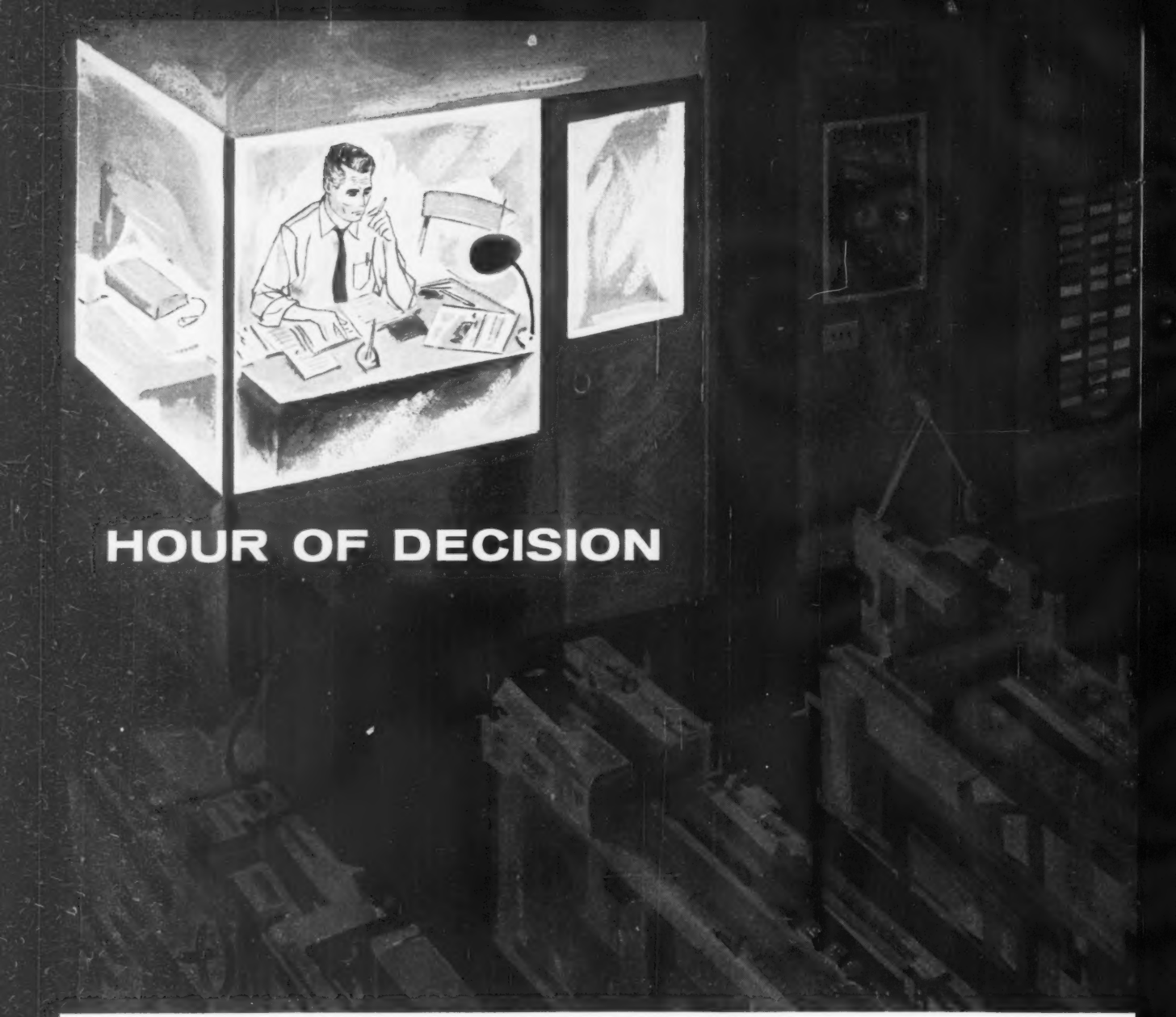
ADDRESS_____

CITY_____ STATE_____

PRODUCT_____

AMPLEX
DIVISION
CHRYSLER
CORP.

A CHRYSLER OILITE® PRODUCT



HOUR OF DECISION

After hours? — sure You're not surprised at that because you know it's when he (and probably you, too) concentrates on the problems which are vital to his company's continued successful growth. The day is filled with production crises, maintenance problems, personnel questions, and committee meetings. It's only now that he can really study the facts and decide what's best.

Right now he's reviewing his machine tool inventory. He's amazed at how old some of his equipment is getting to be. It seems only yesterday that he signed the purchase order for it to increase his capacity for World War II. But that was 1943, seventeen years ago! No wonder maintenance is getting high and efficiency is dropping off.

We've got a suggestion for this man (and for you, too). Attend THE MACHINE TOOL EXPOSITION — 1960 and see for yourself why Modern Machine Tools = Production Efficiency. This exhibit, the first since 1955, is sponsored by The National Machine Tool Builders' Association* and will contain eleven acres of the U.S.A.'s newest machine tools under power, cutting and forming metal to demonstrate 1001 ways to lower production costs. Can you afford to stay home?

You're also invited to the PRODUCTION ENGINEERING SHOW on the Navy Pier.

No extra registration needed.

*The N.M.T.B.A. represents 90% of the U.S.A. machine tool industry.

FORMULA FOR TOMORROW

MODERN MACHINE TOOLS — MMT=PE — PRODUCTION EFFICIENCY

International Amphitheatre
Chicago, Illinois
Sept. 6-16

THE MACHINE TOOL EXPOSITION — 1960

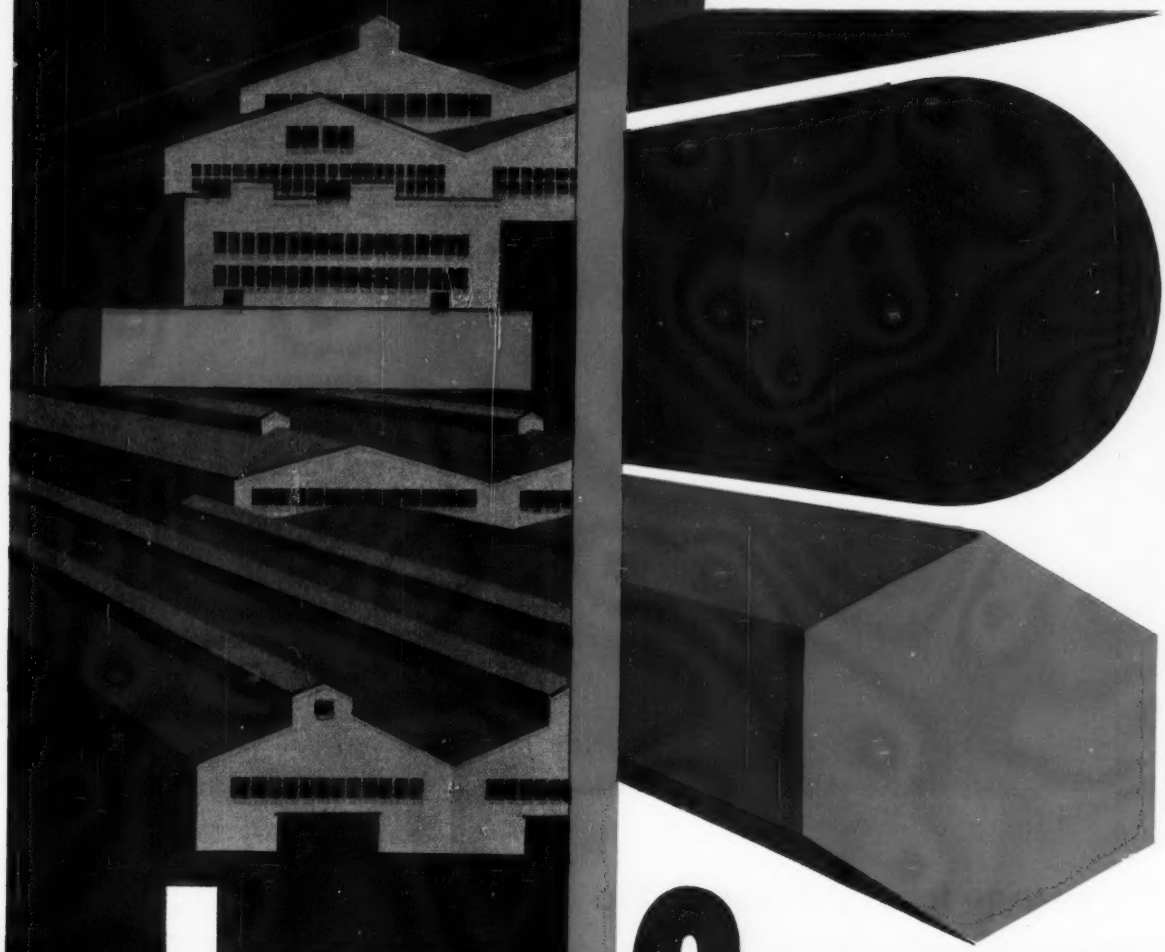
For information write to

NATIONAL MACHINE TOOL BUILDERS ASSOCIATION

2139 Wisconsin Avenue, N.W. • Washington, D. C.

Dealers in American made steel
for over half a century

WHEN YOU NEED STEEL CUT TO SIZE OR FULLY FABRICATED YOU CAN DEPEND ON LEVINSON. THOUSANDS OF COMPANIES HAVE LEARNED TO RELY ON LEVINSON FOR 58 YEARS WITH FULL ASSURANCE THAT THEIR STEEL WILL BE DELIVERED AS SPECIFIED AND ON TIME.



the LEVINSON STEEL COMPANY
Pittsburgh 3, Pa.
Phone: HUbbard 1-3200
AISC

A message from G. Washington

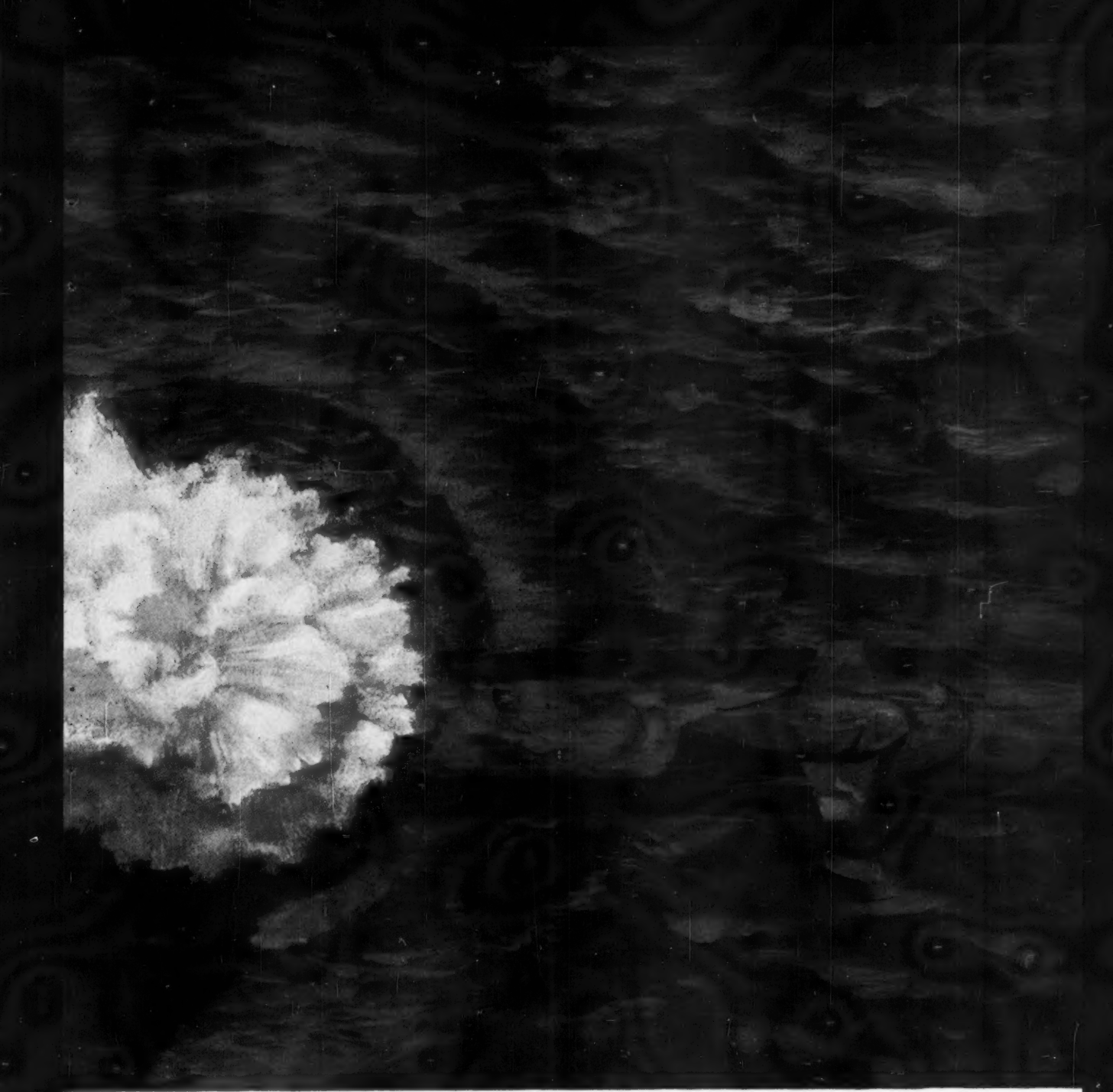
On January 8, 1790, the First President of the United States said, "To be prepared for war is one of the most effective means of preserving peace."

This mark tells you a product is made of modern, dependable Steel.

The USS George Washington, built by Electric Boat Division, General Dynamics Corporation, is the Navy's first mobile ballistic missile base. Cradled inside its steel hull will be 16 business-like Polaris missiles. This new, atomic-powered submarine dives or surfaces as gracefully as a porpoise and it speeds along in excess of twenty knots.

The Polaris Fleet Ballistic Missile (FBM) will be a deterrent weapon. It has a range of 1,200 miles, and travels at speeds up to 10,000 mph. Approximate time from submarine to target: less than 20 minutes.

Compressed air will eject the Polaris. The missile's solid-fuel engines ignite with a roar as it leaps clear



of the water. This new launching method protects the sub from rocket back-blast, and makes it possible for the George Washington to pump a full load of these nuclear-armed missiles into target in minutes.

As part of the Navy-industry team that developed the Polaris and the George Washington, National Tube supplied USS National Seamless Pipe and Tubes, in both carbon and stainless steels, and USS National Seamless Steel Cylinders for air and oxygen systems. If you have a problem related to the field of pipe, or tubular applications, write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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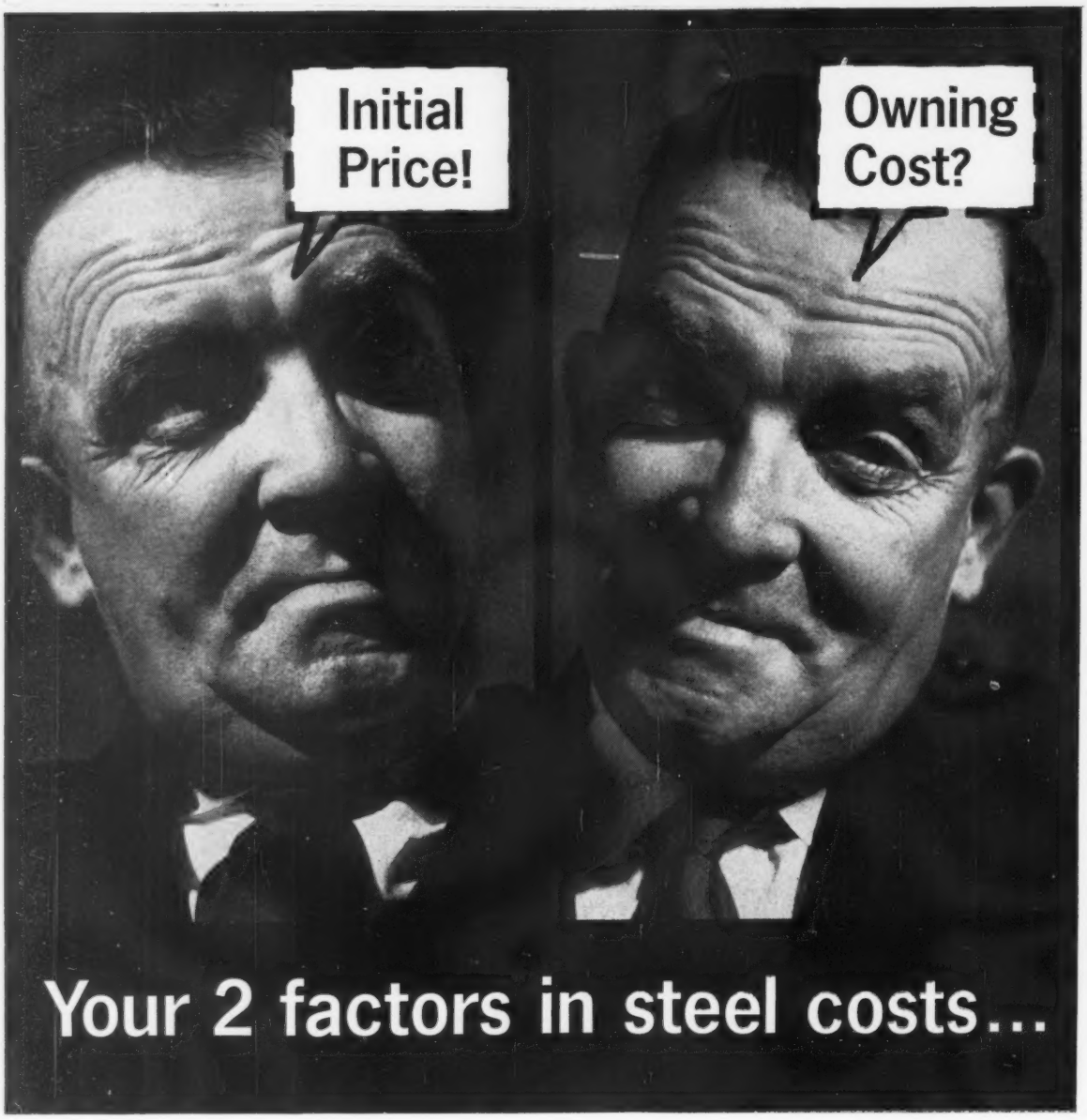
National Tube
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York



Your 2 factors in steel costs...

Steel is a low-cost material. But when you tie up your money in it, store it, insure it, pay taxes on it, buy equipment to handle it, cut and burn it—you often add unnecessarily to this low cost. And the big question is whether you or your nearby steel service center should perform these functions. The wisest thing to do is to find out.

Each steel user's case is different. Your steel service center will be glad to help you determine the most economical way to buy steel. Figure all your costs of possession, such as:

Cost of capital:	Cost of operation:	Other costs:
Inventory	Space	Obsolescence
Space	Materials handling	Insurance
Equipment	Cutting & burning	Taxes
	Scrap & wastage	Accounting

Call your steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

STEEL SERVICE CENTER INSTITUTE

...YOUR STEEL SERVICE CENTER

STEEL SERVICE CENTER INSTITUTE
540-A Terminal Tower, Cleveland 13, Ohio

Steel

To all metals Norton adds the first "Touch of Gold"

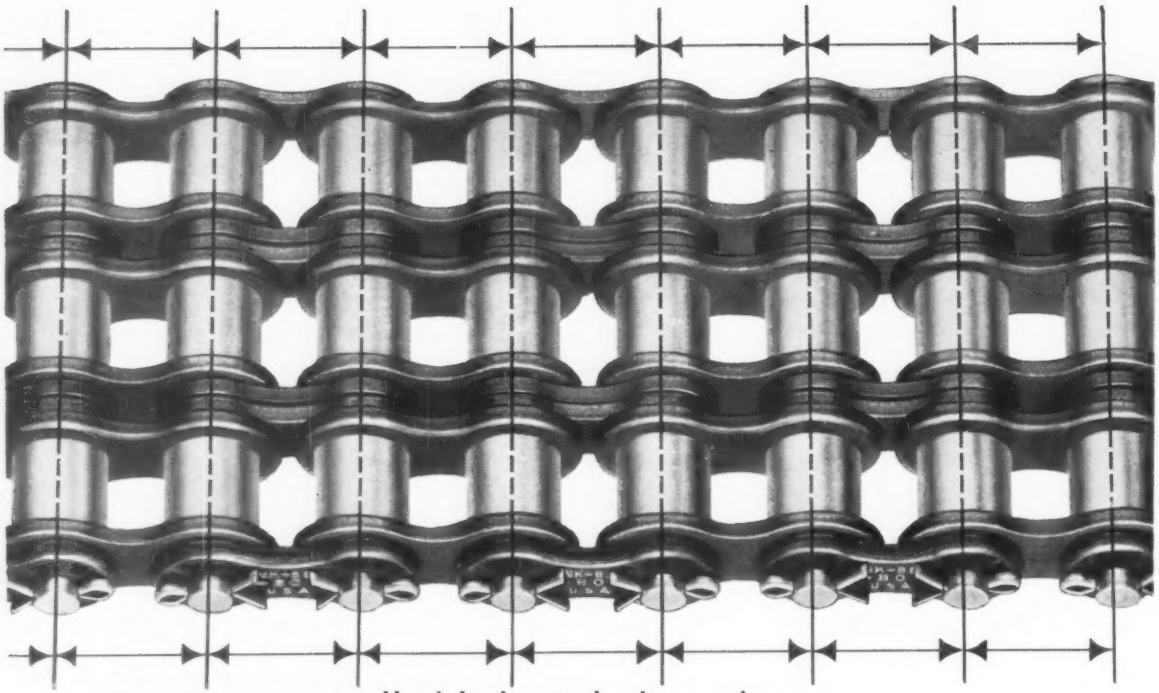
The term "precision-snagging" has yet to be invented – and the delicate touch is not a cleaning room technique. But snagging, the roughest, toughest, most basic type of grinding does benefit considerably by the "Touch of Gold" — built into all Norton grinding wheels to improve product quality and cut production costs.

Your operators, working on machines of any type or size, will like the easy, fast-cutting action of Norton snagging wheels. And *you'll* like the way they grind off more metal per dollar and turn out better work, bringing the true "Touch of Gold" to your production. See your Norton Man or your Norton distributor about test runs to determine exactly the wheels you need for best results on any metal. NORTON COMPANY, General Offices, Worcester 6, Mass.

NORTON
ABRASIVES

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes



Precision controlled link pitch throughout
LINK-BELT roller chain means

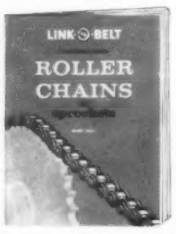
equal length... equal strength

How pre-stressing ensures uniform load distribution of multiple-width LINK-BELT roller chain

Pre-stressing is one of the reasons why Link-Belt multiple-width precision steel roller chains easily handle the grueling loads common on today's drives. It seats and cold works the chain joint parts, assuring equal load distribution across the chain, minimum initial elongation, increased fatigue life.

Pre-stressing is just one of many "extras" that contribute to the *greater dynamic strength* of Link-Belt roller chain. Others include: close heat-treat control, lock-type bushings, shot-peened rollers, pitch-hole preparation. For details see Book 2657.

PRE-STRESSING MACHINE provides the pull that "sets" the parts of Link-Belt multiple-width roller chain. Besides assuring uniform load distribution, pre-stressing eliminates application difficulties on fixed center drives because the chain leaves the factory at precise operational length.



BOOK 2657 has 154 pages of roller chain data. Contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

LINK-BELT

THE SYMBOL OF QUALITY — LINK-BELT

ROLLER CHAINS AND SPROCKETS

15,361

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

World Steel Production Sets Six Month Record

World steel production reached a record 187 million ingot tons in 1960's first half—8 per cent above the like 1959 period. All major producing countries except the U. S. recorded increases, says the Commerce Department. Here's the ingot tonnage and the percentage change from the like 1959 periods:

U. S.	60,743	−5%	Italy	4,527	+30%
Canada	3,122	+12%	United Kingdom	13,872	+28%
West Germany	18,381	+23%	USSR	35,200	+9%
France	9,531	+15%	Japan	11,600	+40%
Benelux	7,298	+18%	Other countries	23,000	+7%

Steel Exports Up, Imports Down

June exports of steel mill products reached the highest level since October, 1957, while imports dropped to the lowest point since November, 1958, the Commerce Department reports. Imports for 1960's first half, however, total 2,216,000 net tons—750,000 tons above exports for the same period. The biggest export jump came in sheets and strip; the main import decline was in reinforcing bars.

How First Half Stacked Up for Steel Industry

Employment up, output down, labor cost per hour up—that's how the first half of 1960 compared with 1959's first half for the steel industry. The American Iron & Steel Institute says employment of hourly and salaried workers was 621,603—up 2.4 per cent; payroll cost per hour for hourly employees was $3.367—vs. $3.339; output of raw steel declined 5.5 per cent.

British Steel Industry Booming

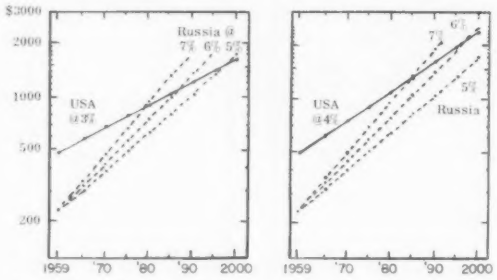
British engineers are busy repairing steel plant facilities so they can go full blast during the last four months of this year. Some firms have their production schedules full for that period and are booking orders for 1961's first quarter. There's little doubt that the industry will reach its 1960 output goal of 24.3 million ingot tons. And the British auto industry is importing sheets to keep its production lines humming. Unemployment in Britain (1.3 per cent of the labor force) is the lowest in three years.

In Labor, Peace and Turmoil

Firestone, Goodyear, and Goodrich reached new labor agreements with the United Rubber Workers calling for 9.5 cents an hour wage increase plus extra allowances for skilled workers—close to the 9.2 cents national average for the first half of this year . . . When STEEL went to press, 12,000 employees of Jones & Laughlin Steel Corp.'s Pittsburgh Works were idled by a strike

of 300 railroad workers . . . Operations of New Jersey Zinc Co. were paralyzed last week by a United Steelworkers strike at two smelters and five mines, shutting off about 10,000 tons of zinc production a month (and Bunker Hill Co. is losing 6000 tons of zinc production monthly due to a labor dispute). . . . About 6000 Zenith Radio Corp. workers at four plants walked out last week.

Can Russia Catch Us Soon?



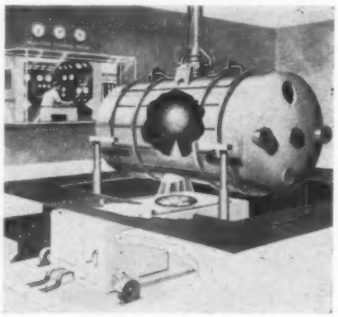
The chart at left shows that Russia's gross national product will catch up to ours in 20 years if we continue our 3 per cent annual growth rate and she can hold her 7 per cent pace. But, as the other chart indicates, if we grow at 4 per cent and Russia grows at 5 per cent, it will take her 70 years to catch us. National City Bank of Cleveland says most analyses indicate a 4 per cent annual growth rate for the U. S. in the 1960s.

USW Uses Hard Sell, But How Will It Do in 'Porto Rico'?

The United Steelworkers union is using hard sell tactics in an effort to thwart the dues rebels before the union meeting Sept. 19-23 in Atlantic City. In the August issue of *Steel Labor*, the union's official publication, the center spread is devoted to a pitch on what the USW member gets for his dues. But observers wonder how USW leadership will make out in Puerto Rico—which *Steel Labor* spells "Porto Rico."

Unit Simulates Problems in Space

Minneapolis-Honeywell Regulator Co. is building a dynamic analyzer for Wright-Patterson AFB, Dayton, Ohio. It will permit laboratory study of the effects of buffeting, vibration, pitch, yaw, and roll of aerospace vehicles. Burns & Roe Inc., New York, will design and install support facilities, including a movable plastic tunnel through which ultrapure test samples will be transported.

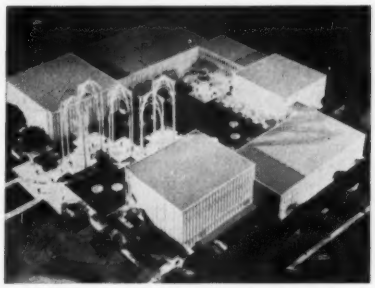


Attention Marketeers: U. S. Has 21 New 'Big Cities'

If you give special marketing emphasis to metropolitan areas with 50,000 or more people, you'll have to add 21 cities to your list: Abilene (Tex.), Albany (Ga.), Billings (Mont.), Brownsville-Harlingen-San Benito (Tex.), Colorado Springs (Colo.), Eugene (Oreg.), Fargo-Moorhead (N. Dak., Minn.), Ft. Lauderdale-Hollywood (Fla.), Great Falls (Mont.), Huntsville (Ala.), Lake Charles (La.), Las Vegas (Nev.), Lawton (Okla.), Midland (Tex.),

Monroe (La.), Odessa (Tex.), Provo-Orem (Utah), Reno (Nev.), Texarkana (Tex.-Ark.), Tuscaloosa (Ala.), Tyler (Tex.). The Bureau of the Budget says three more areas are under study: Meriden (Conn.), New London-Groton (Conn.), and Norwalk (Conn.).

A Peek into the 21st Century



More than $70 million has already been poured into land, buildings, and exhibits for the spectacular Century 21 Exposition, coming up in Seattle, April 21-Oct. 21, 1962. Photo at left shows the Coliseum of Nations; at right, the $3.5 million World of Science pavilion. Congress has appropriated $9 million for government participation in the exposition, keyed to man's role in the Space Age. The 74 acre site will hold international exhibits of industry, commerce, and the arts.

Imports Up in First Half

The U. S. imported merchandise valued at $7.6 billion during the first half—up from $7.4 billion during the like 1959 period. June imports totaled $1.3 billion—up 4 per cent from May's. June imports of metals and manufactures totaled $212 million—up 14 per cent from May, while June imports of machinery and vehicles totaled $128 million—down 7 per cent from May.

New Census Data Reshuffles Rank of Counties

If you allocate marketing effort according to population, get the Census Bureau's new listing of counties. There's been a lot of shifting since the last census. Examples:

County	New Rank	Population (In millions)	Old Rank
Los Angeles (Calif.)	1	5.98	2
Cook (Ill.)	2	5.09	1
Wayne (Mich.)	3	2.65	4
Kings (N. Y.)	4	2.60	3
Philadelphia (Pa.)	5	1.96	5
Queens (N. Y.)	6	1.80	7
New York (N. Y.)	7	1.67	6
Cuyahoga (Ohio)	8	1.63	10

County	New Rank	Population (In millions)	Old Rank
Allegheny (Pa.)	9	1.62	8
Bronx (N. Y.)	10	1.42	9
Nassau (N. Y.)	11	1.29	25
San Diego (Calif.)	16	1.00	32
Dade (Fla.)	19	0.92	43
Orange (Calif.)	28	0.70	108
St. Louis (Mo.)	29	0.69	52
Suffolk (N. Y.)	35	0.66	81

RCA Makes Electroluminescent Panels

Radio Corp. of America has started making electroluminescent lighting panels for consumer, industrial, and military uses. They'll give off a soft glow of light in any one of four colors—green, blue, yellow, orange—and white. Called "Panelray," they'll be used in a new RCA night light, which will soon hit the market. They'll operate 24 hours a day for a full year for less than

1 cent. The firm will make custom panels to meet design requirements. Applications cited: Home appliance controls, wall switch plates, night lights, control panels for industry and the military, signs for advertising and safety, interior decoration.

UN Compiles Global Trade Figures

The United Nations has published global trade figures for the first time. Of $114 billion worth of export sales in 1959 for all nations, Free World sales totaled almost $100 billion. Red China's imports totaled $2.25 billion. European-Soviet Bloc exports to Western Europe totaled $1.35 billion.

Africa to Get Lead Smelter

Tsumeb Corp. Ltd. plans to build a lead smelter and refinery at its mines at Tsumeb in southwest Africa. Scheduled completion: Mid-1963. The company's current output is shipped to U. S. and European smelters. The company's principal owners include American Metal Climax, Newmont Mining, O'Kiep Copper, and three British firms.

Venezuelan Steelmaker to Expand, Modernize, Diversify

The International Finance Corp. will invest $3 million in Siderurgica Venezolana S.A., to help the firm finance a $6.2 million expansion, modernization, and diversification program. Included: Hike rolling capacity from 60,000 to more than 90,000 tons annually.

Straws in the Wind

Dr. Simon Ramo says Thompson Ramo Wooldridge Inc. will double, perhaps triple, its capacity by 1965—with special emphasis on foreign activities . . . 56 industrial plants are under construction or planned along navigable channels in the U. S., reports American Waterways Operators . . . Radio Corp. of America has established a leasing plan for scientific instruments . . . About 3000 employees of Fisher Body Div. and Chevrolet Div. plants were laid off last week (for three weeks) for model changeovers . . . Inland Steel Co.'s largest ore boat, the *Edward L. Ryerson*, carried a record load of iron ore (23,378 gross tons) on its maiden voyage—from Escanaba, Mich., to Indiana Harbor, Ind.

Metalworking Pulse

The Business Trend: In leveling off at a preliminary 153 (1947-49=100) in late July and early August, STEEL's industrial production index is following a pattern firmly entrenched since 1954. Cause: Auto model changeovers. **Autos:** Ford Motor Co. and some GM divisions—mainly Chevrolet—are the last to produce '60 model cars. Chrysler Corp. is first to turn out 1961s on a major scale. **Steel:** Mills continued to coast along just above the 50 per cent of capacity mark awaiting auto orders.

- **INDUSTRIAL PRODUCTION**
  - Week ended Aug. 6 .... **153†**
  - Year ago **117**
  - Details on Page 65
- **PASSENGER CAR PRODUCTION**
  - Week ended Aug. 13 .. **80,000***
  - Year ago **72,603**
  - Details on Page 62
- **INGOT PRODUCTION RATE**
  - Week ended Aug. 14 . **54.6%†**
  - Week ago **53.9%**
  - Details on Page 122

†Preliminary. *Estimated.

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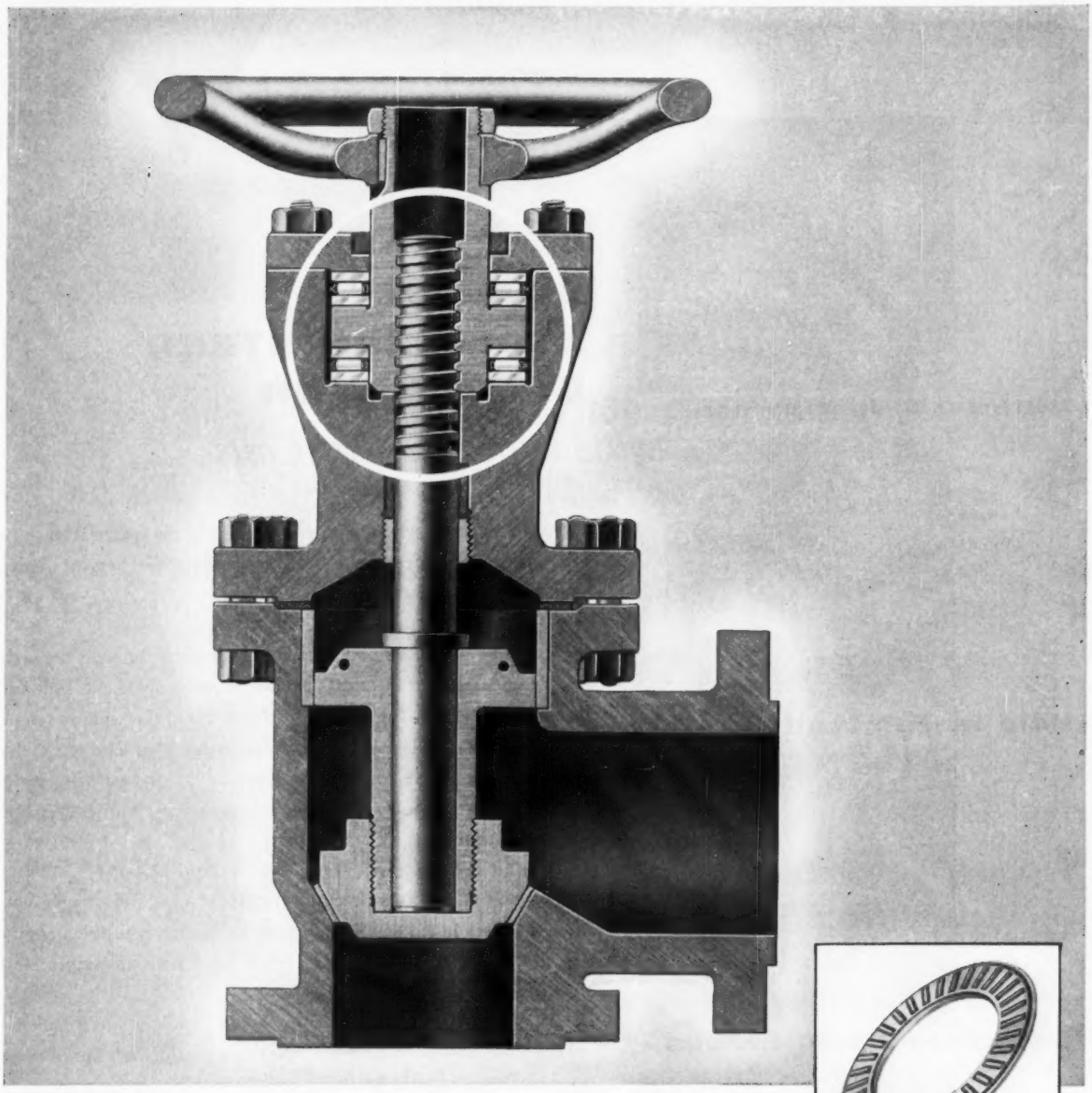


Compact valve design, easier operation with Torrington Needle Thrust Bearings

High thrust capacity, thin cross section and low unit cost have made Torrington Needle Thrust Bearings a natural choice for top valve performance. With Torrington Needle Thrust Bearings, only a fraction of the normal closing effort is needed. This puts less strain on the valve... means smoother, more reliable operation. Lifetime pregreasing insures peak efficiency over years of extra service life.

Torrington Needle Thrust Bearings are exceptionally compact. They provide an assembled height far less than any other type of thrust bearing. They may be run directly on adjacent hardened and ground surfaces, or, as shown above, on standard Torrington thrust races.

If you make gate valves, globe valves, angle valves—in fact, any valve closed on a threaded stem—you'll find it pays to investigate the top efficiency of Torrington Needle Thrust Bearings. Call or write Torrington—maker of every basic type of anti-friction bearing.

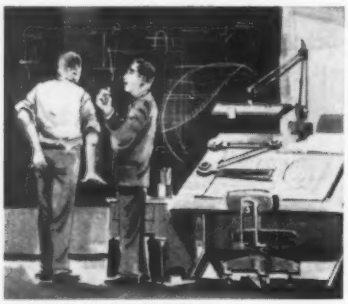
Torrington Needle Thrust Bearing

Torrington Thrust Race

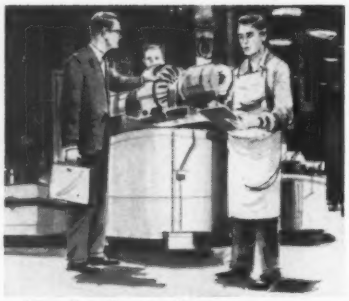
progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY Torrington, Conn. • South Bend 21, Indiana

New steels are born at Armco



Material Selection



Help in Fabrication

Complete Local Stocks

Fast Service

Let Your ARMCO STAINLESS STEEL DISTRIBUTOR *Help You Cut Costs*

At every stage of production, from selecting the material to shipping, your Armco Stainless Steel Distributor's Steel Service Center can help save you money.

Mill-trained engineers and salesmen, backed by Armco's research and engineering staff, can provide valuable help in stainless grade selection and fabrication methods. From the wide range of standard and special Armco Stainless Steels you can select the stainless that meets your requirements and costs you the least. Specialists with Armco Distributors can suggest fabrication tips that cut production time and costs.

Your Armco Distributor's extensive stocks of stainless give you a storage-free inventory. In addition, he has many supplementary services that can be integrated with your own manufacturing facilities to further cut costs.

Make most effective use of the many cost-cutting services of your Armco Distributor by knowing exactly *how* he can help you save money. Get in touch with him today. If you don't know him, write us for the name of the Armco Stainless Steel Distributor in your area. Armco Steel Corporation, 2250 Curtis St., Middletown, Ohio.

Stainless Steel

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Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

What Happened to The Soaring Sixties?

Late in 1959, the feeling was pretty universal that we were on the threshold of a new decade that could be appropriately called the "Soaring Sixties."

The forecasters came up with these typical figures for 1960:

- Gross national product of $510 billion vs. $479.5 billion in 1959.
- Capital spending of $38 billion vs. $32.5 billion in 1959.
- Steel production of 130 million tons vs. 93.5 million in 1959, a strike year.

But as we get deeper into 1960, earlier optimism is giving way to growing pessimism.

The forecasters have been gradually "adjusting" their forecasts downward. The GNP for 1960 is now estimated at $506.5 billion, capital spending at $36.8 billion, steel production at 108 million tons.

The change in sentiment is blamed on many things, including international uncertainty, foreign competition, changing inventory policies, and shrinking profit margins resulting in less capital spending.

In looking ahead currently, proponents of the three year business cycle will tell you that we are in for a mild recession in 1961, to be followed by a strong upsurge in 1962 and 1963.

Even if the economy follows that pattern, we think there is no reason for panicky thinking.

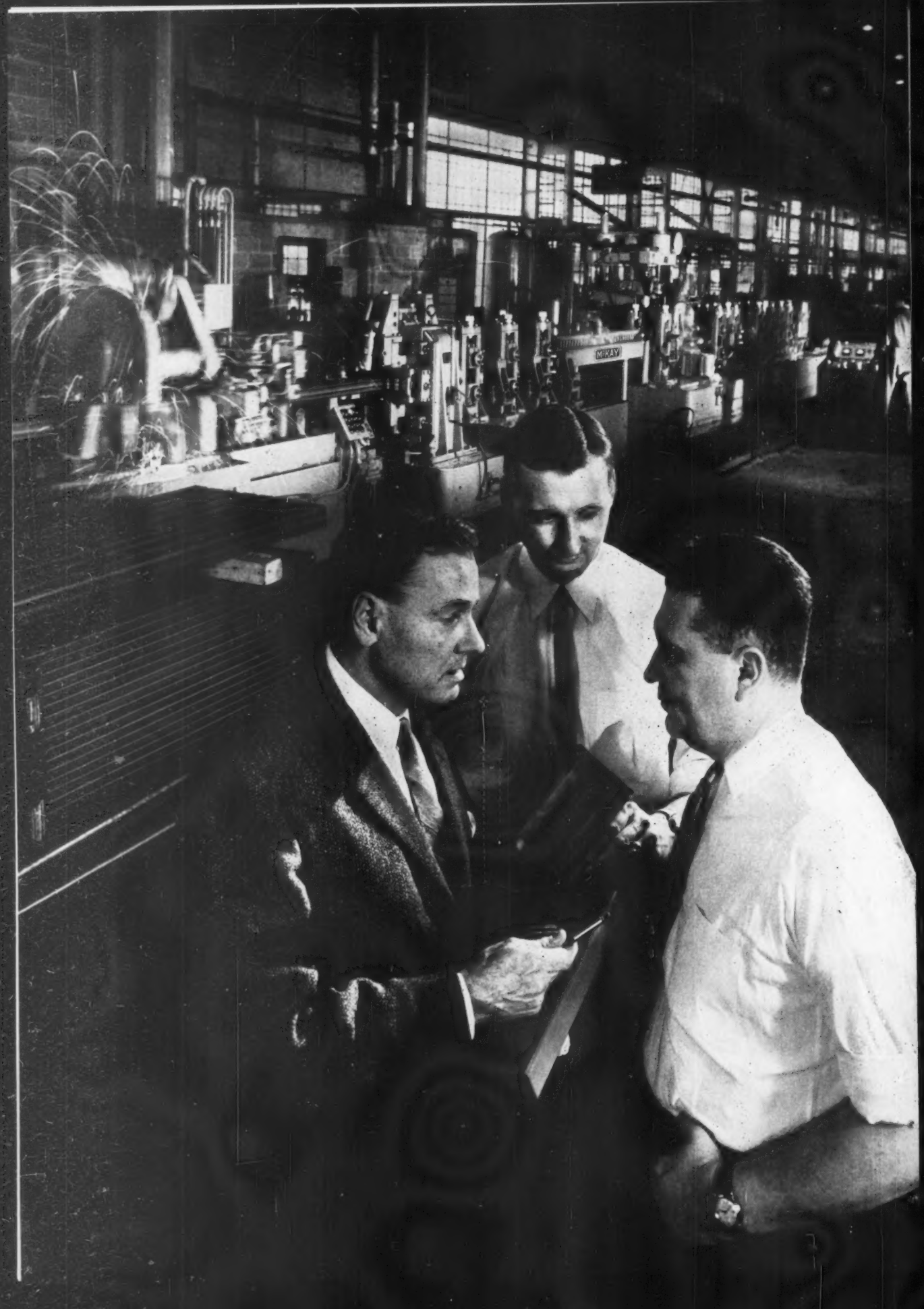
The long term outlook is still good.

All the factors of growth are still present, including the new products resulting from the $10 billion a year we are spending on research and the markets provided by an expanding population.

Like most people in management, we think you will want to discount temporary deviations in the business trend and plan solidly for what still can be the "Soaring Sixties."

Irwin H. Such

EDITOR-IN-CHIEF


MEKAY

How McKay Tube Mills give Walker Brothers a competitive edge

"Our new McKay 5″ Tube Mill enables us to extend our production range to the larger sizes of Walkerduct and steel tubing. The mill affords close manufacturing tolerances and improved control over production schedules," says H. Newton Walker, President of Walker Brothers, Conshohocken, Pa.

High Quality Product—Walker Brothers has been a primary supplier of high quality electrical distribution materials to the commercial and industrial construction industry for fifty years. "Walker of Conshohocken" products include building wire, power and control cables, mechanical steel tubing, steel electrical metallic tubing, rigid steel conduit and underfloor raceways.

"This is the third McKay Tube Mill we have installed since 1951 to increase our capacity to manufacture conduit and raceways," continues Mr. Walker. "Each of these mills," he says, "has turned out a product consistent with our high standards of manufacture."

Better Production Economies—Walker Brothers has, in addition to the new McKay 5″ Tube Mill, two 3″-capacity McKay mills equipped with strip looping and welding equipment. These mills are generally used to produce ½″ through 2″ thin wall conduit on a continuous basis at a speed of 150 feet per minute. The new 5″ mill also operates at 150 F.P.M. and at that speed can easily produce Walker's line of 6.5″ x 1.5″ x .076″ rectangular raceway.

Mr. Walter Cubberley, Vice President, Production, states: "We have been most satisfied with the performance of this equipment. Performance of the McKay mill has more than met our expectations regarding versatility and cost savings."

Low Maintenance Cost—"There's something to be said for the design of this equipment, too," he says, "in that maintenance is, and has been, satisfactorily low regardless of the age of the machinery."

"This is very solid equipment, including the welder. In fact, I would say these are the best mills we could have selected for our type of operation," Mr. Cubberley concludes.

McKay Machine designs and builds electricweld tube mills for high speed production of ferrous and nonferrous welded tubing up to 20″ in diameter. The experience of nearly 25 years of pioneering in the design of tube making equipment is behind each modern McKay Tube Mill.

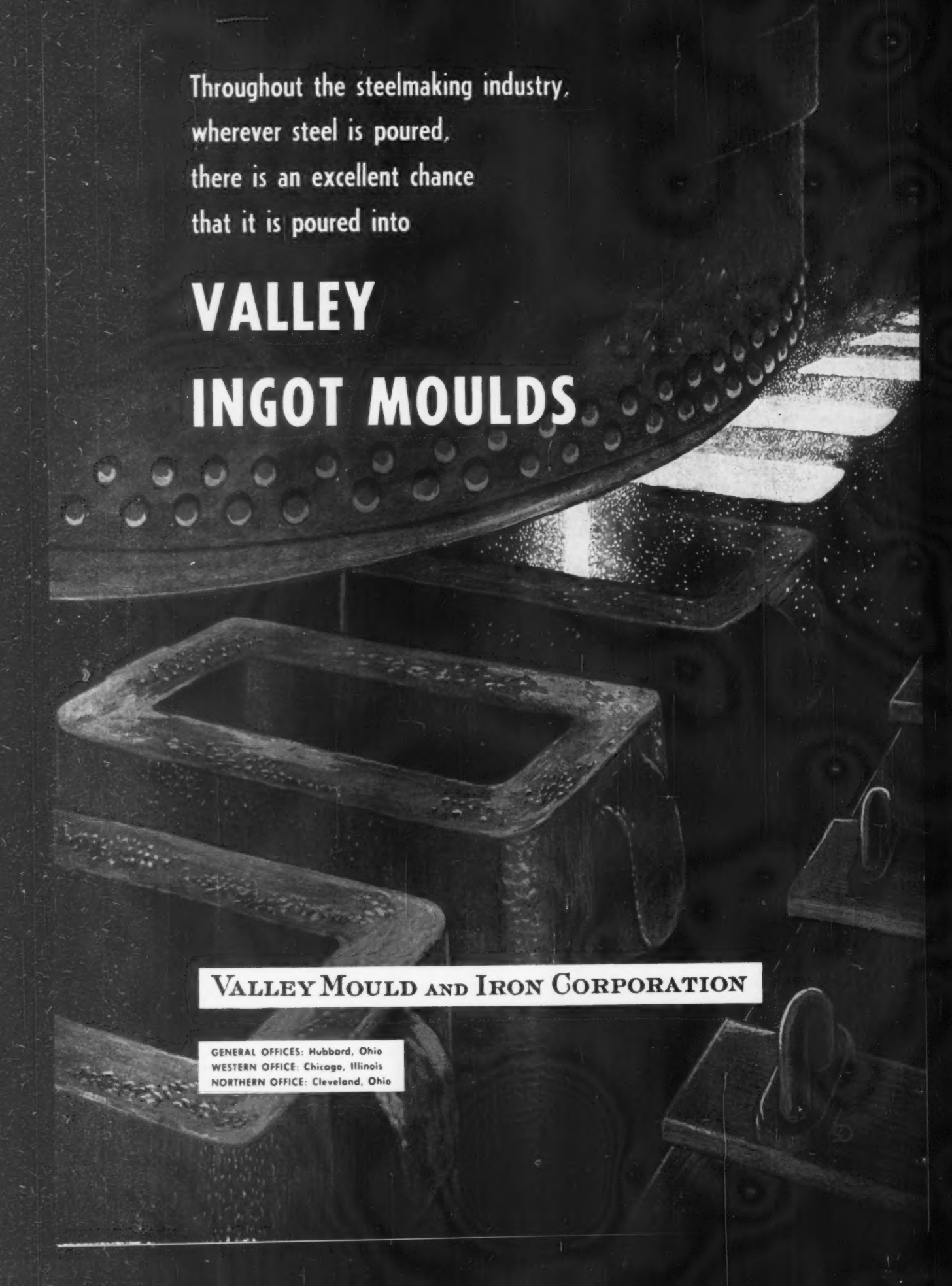
Write for literature, or send a description of your needs for prompt quotation to McKay Machine Company, Youngstown 1, Ohio.

Photo by Arnold Newman shows H. Newton Walker, President of Walker Brothers, speaking with Walter A. Cubberley (R.), Vice President, Production, and McKay sales engineer, Edward M. Lyden, about the high quality product Walker's new McKay 5″ Tube Mill is producing.

LOOK TO

McKAY MCK MACHINE

FOR PROGRESS IN METAL PROCESSING


Throughout the steelmaking industry,
wherever steel is poured,
there is an excellent chance
that it is poured into
VALLEY
INGOT MOULDS
VALLEY MOULD AND IRON CORPORATION
GENERAL OFFICES: Hubbard, Ohio
WESTERN OFFICE: Chicago, Illinois
NORTHERN OFFICE: Cleveland, Ohio

Consumers Spend Less for Durable Goods

(Billions of dollars)

	1950	1955	1959
TOTAL PERSONAL INCOME	$228.5	$310.2	$383.3

	1950 TOTAL SPENT	1950 PERCENTAGE OF INCOME	1955 TOTAL SPENT	1955 PERCENTAGE OF INCOME	1959 TOTAL SPENT	1959 PERCENTAGE OF INCOME
DURABLE GOODS	$30.4	13.3	$39.6	12.8	$43.4	11.3
Automobiles & parts	13.0	5.7	18.3	5.9	17.8	4.7
Furniture & household equipment	14.0	6.1	16.6	5.4	18.8	4.9
Other	3.4	1.5	4.7	1.5	6.6	1.7
NONDURABLE GOODS	99.8	43.7	124.8	40.2	147.6	38.5
Food & Beverages	55.2	24.2	67.9	21.9	78.2	20.4
Clothing & shoes	19.6	8.6	23.4	7.5	27.4	7.1
Other	25.0	10.9	33.5	10.8	42.0	11.0
SERVICES	64.9	28.4	92.5	29.8	122.8	32.0
Housing	21.2	9.3	30.7	9.9	40.5	10.6
Household operation	9.3	4.1	13.5	4.4	18.0	4.7
Transportation	6.3	2.7	8.4	2.7	9.8	2.5
Other	28.1	12.3	39.9	12.8	54.5	14.2

Source: Commerce Department.

Appliance makers seek a way . . .

How to Get More of the Buyer's Dollar

THE APPLIANCE INDUSTRY is losing its share of the consumer's dollar.

Robert H. Quayle Jr., president, Norge Div. of Borg-Warner Corp., blames "lack of revolutionary product development, no solutions for new consumer demands (such as longer lasting appliances), and excessively high service costs." B. A. Chapman, general manager, Kelvinator Div., American Motors Corp., complains about "meaningless model changes" (see Page 47) and charges that "discounting and fictitious sales methods have made buyers wary and hesitant."

A knowledgeable marketing man observes: "The challenge to the appliance industry is to create interest in its products." Needed are such advances as we've seen in the past decade: Greatly increased storage capacity at no increase in cabinet dimensions or price, better frozen food storage, and automatic defrosting. In this decade, three new principles offer hope of a fresh breakthrough—refrigeration by thermoelectricity, cooking and other heating by electronics, and cleaning and waste disposal by ultrasonics.

• **The Record**—First half factory sales of major appliances were disappointing (see table on Page 46).

Mr. Quayle expects no improvement in the second half. He predicts that unit sales to dealers will be 7 per cent less than they were in 1959. The marketing director of another large firm expects "some pickup in distributor sales to dealers—partly because of new model introductions and partly because

Appliance Sales Miss the Mark

(Factory shipments)

	1960 FORECAST VS. 1959	ACTUAL VS. 1959 FIRST HALF
Automatic & semi-automatic washers	+ 6%	−10%
Dishwashers	+10	+15
Electric dryers	+ 7	− 8
Gas dryers	+ 3	+ 1
Home freezers	Same	−12
Electric ranges	+ 4	− 8
Gas ranges	+ 5	− 4
Refrigerators	+ 1	− 5
Washer-dryers	+28	− 8
Wringer washers	−10	−15

Sources: National Electrical Manufacturers Association; American Home Laundry Manufacturers Association; Gas Appliance Manufacturers Association.

there are some indications of an economic upturn."

• **Too Much Production**—At the start of the model year (October, 1959), appliances were in strong demand, and they continued to sell at a high rate through February. In March, refrigerators started to slip. By the time appliance men realized that retail sales were dropping below their projections, it was too late to prevent inventories from piling up. On Apr. 1, factory and distributor warehouses were jammed with 3.8 million refrigerators, ranges, washers, and dryers—nearly 16 per cent more than a year earlier.

• **Too Much Competition** — Although appliance makers worry about competing with each other, they know full well that their big competition is with other products and services. In 1950, appliances accounted for 14.2 per cent of the money spent for durable goods. Last year, the figure was 11.5 per cent. Why?

Here are some of the theories advanced by marketing experts:

• Appliance prices haven't gone up nearly as much as those of other items. They're lower, in fact, than they were a few years ago. For evidence, check the consumer price index published by the Bureau of Labor Statistics (1945-47 equals 100). Last year, all items averaged 125.7. New cars were 139.6, domestic help 141, and commercial laundries 145. Washing machines stood at 95.5, refrigerators 63.8.

• People are spending more for fun and leisure time activities—boats, swimming pools, vacations.

• They're eating better foods and drinking more alcoholic beverages.

• More people are going to college, and the costs of education are rising at an unprecedented rate.

• Services are booming.

• Appliances may be hurt by the upturn in new car sales. Auto production is up 10.6 per cent this year, but appliance shipments are down 7 per cent. Normally they move together.

Do You Believe in Planned Obsolescence?

Elisha Gray II, chairman, Whirlpool Corp., answered the question this way at a technical conference of the American Home Laundry Manufacturers Association this spring

"You can usually see the sandbag look in the questioner's eye when he asks that.

"He wants you to say 'yes.'

"And then he will rip into you with some nonsense about greedy manufacturers who bilk the public into unnecessary purchases.

"This pseudo-intellectual (male or female) is giving the phrase 'planned obsolescence' its worst and most thoughtless connotation.

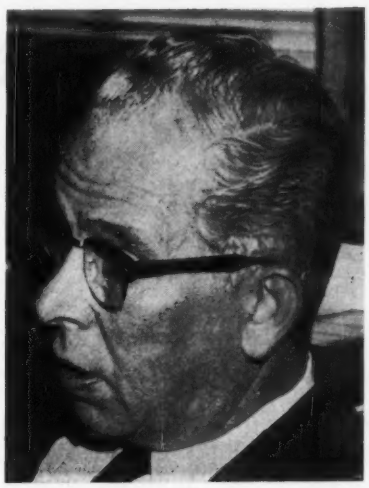
"I reply that I am in favor of progress in all things. And I reply that progress in our mechanical things involves new and improved devices for performing the ordinary chores of the home. If my questioner is a woman, I add that because of such improved devices she no longer spends two and a half days a week over a wash boiler and scrub board.

"Then I say that because we tooled up for that new combination, her neighbor who runs a toolshop did enough business to afford to buy his wife a new watch from the jeweler who is my questioner's husband.

"Now I try to cut her argument right in two by saying that if she chooses to call that process 'planned obsolescence,' then my answer is: 'Yes, you're right, I am in favor of planned obsolescence, and I lie awake nights trying to plan more.' "

"We'll bring out advances as soon as they are ready," says B. A. Chapman, Kelvinator's executive vice president

"We're betting on a new kind of customer — more knowledgeable, more sophisticated, more interested in value for her money"



"We're confident our manufacturing costs can be considerably reduced"

Kelvinator Advances 'Constant Basic Improvement'

EARLY THIS YEAR, American Motors Corp.'s Kelvinator Div. introduced a new concept to its appliance business. Called CBI (Constant Basic Improvement), the program follows AMC's philosophy of replacing annual styling changes with useful product improvements.

STEEL asked B. A. Chapman, executive vice president and general manager of Kelvinator Div., what he thinks CBI means to the appliance industry and to AMC.

Q. Mr. Chapman, do you believe the lower appliance sales this year are in any way caused by annual styling obsolescence?

A. "I certainly don't think styling is a direct factor, but I do believe that because so much effort has been applied to superficial facelifts not enough engineering and development have gone into the planning and improvement of appliances. I also think that discounting and fictitious sales methods have made buyers wary and hesitant."

Q. There has been much discussion about annual styling obsolescence. What are the basic reasons against it?

A. "The main advantages cited for annual model changes appear to be these: 1. Organization for the orderly presentation of an accumulation of minor changes. 2. Establishment of deadlines for the concentration of effort. 3. Development of fresh merchandise and new merchandising springboards. 4. Introduction of improvements.

"It's difficult for me to see how any of those things must be tied to a specific point in the calendar except by habit."

Q. What proof can you offer that facelifts do not affect sales as much as many industries believe?

A. "At a New York press conference attended by nearly 100 persons, we displayed ten refrigerators. They included comparable 1959 and 1960 models of five leading builders, including Kelvinator. Brandnames and emblems were taped over. We asked these people to identify the refrigerators by brand and model year.

"The group included appliance industry officials and top dealers as well as newsmen. Half the audience backed out immediately. Of the answers turned in, only 52 per cent correctly identified the brands and only 25 per cent correctly identified the model year. If the experts themselves have trouble telling one make from another and even one year's model from the next, how meaningful do you suppose the annual model change is to the consumer?"

Q. Does Kelvinator's policy mean you will bring out new models only infrequently?

A. "Not at all! It simply means we are putting all our engineering and development efforts into producing a product that can do something better than our existing products can do them—not just differently. We'll bring out these advances as soon as they are ready. For example, our present line of washers might be considered to be last year's models by the rest of the industry's standards, but while they look the same, they actually embody 32 engineering changes that have resulted in a far more improved washer than the one we introduced a year ago."

Q. Does your CBI program mean you will be able to lower prices?

A. "Not necessarily, although that could happen. It does mean that we will more easily be able to keep our prices competitive with the rest of the industry."

Fight on Management Rights Brews

IUE President Carey and Chief GE Negotiator Moore are protagonists. In the current installment of this labor-management battle, industry's banner is being carried by the electrical industry. Steel bore it last year, and auto negotiators will have it in 1961

JAMES B. CAREY

PHILIP D. MOORE

UNDERNEATH the relative calm of GE and Westinghouse negotiations with the IUE lurks a battle for management rights.

The fight didn't go too well for industry in steel last year. That's why the General Electric Co. and Westinghouse Electric Corp. parleys assume even greater importance than usual.

• **Union Strategy** — Employment security is the central theme of the International Union of Electrical-workers and the three other AFL-CIO unions that have joined it in negotiations—United Auto Workers, International Association of Machinists, and the International Brotherhood of Electrical Workers. In the GE talks, the unions took two weeks presenting their case:

• Their proposal for a joint committee to study the problems of automation, with a time limit of six to nine months. Following the committee's report, negotiations would take place to determine what is to be done about the report.

• IUE President James B. Carey also wants management to provide employees with the right to move with the job to new plants and to carry with them all service credits except seniority.

• In addition, the unions want to limit the contracting of work with outside firms. Maintenance is not all that's involved. Management would be restricted from subcontracting components "to plants with substandard wages and working conditions."

• Another demand would limit overtime. It would be prohibited until those on short weeks have been employed fully and those on layoff who can do the work have been recalled.

• Demands for supplemental unemployment benefits (SUB) and separation pay were also made as part of the job security package.

• **GE Tactics**—The chief GE negotiator, Philip D. Moore, has just finished two weeks of rebuttal. One of his points: Job security is subject to local conditions. Each plant should have its own arrangements. The issue does not lend itself to national rules.

His other chief argument: The only true way to assure job security is to make products with such high values that they'll be sold in great quantities to bring full employment.

The company isn't commenting about counterproposals. But one might be a new offer of its Savings & Security Plan. That was presented before and rejected by the IUE. Yet, it has been enthusiastically accepted by nonunion and certain other employees, 92 per cent of whom are participating. The program allows an employee to put up to 6 per cent of his annual salary or straight-time wages into a savings account. The company matches the deposits 50 cents on the dollar.

• **Demands' Cost** — Beginning tomorrow (Aug. 16), the GE-IUE discussions will range over all the demands.

Their cost (as computed by the company) over the two year contract term proposed by the union:

Wage increase (at 3½ per cent ..	$186 million
Supplementary unemployment benefits	$102 million
Holiday and vacation provisions	$ 50 million
Sick pay provisions	$ 26 million
Eliminate employee contribution for pensions and insurance	$ 43 million
Total	$407 million

In addition, says GE, the many other demands—such as elimination of wage differentials, skilled increases, cost of living additions, and liberalization of pension and insurance provisions—can be "conservatively estimated to reach at least $500 million, perhaps $750 million in two years."

• **Alternative** — GE's argument is that the values in its products would be eroded if it should grant such demands. That would lead to lower volume and less employment security.

So stands the battle for management rights at GE today. Although Westinghouse began its talks with the AFL-CIO group later, its position is about the same. (Both companies also are negotiating with the United Electrical Workers who are emphasizing the 35 hour week, but the UE will follow the IUE pattern). GE's contract expires Oct. 1, Westinghouse's Oct. 15. Both companies have shown before that they'll suffer a national strike to uphold their positions—GE in 1946 and Westinghouse in 1955.

The odds this time? They favor a peaceful settlement at both companies, with management's rights upheld.

Pittsburgh Steel Settles With USW on Incentive Pay

"VICTORY in understanding."

That's the way Pittsburgh Steel Co. officials labeled the strike-averting settlement of the incentive pay issue with the United Steelworkers.

Don C. Duvall, executive vice president of Pittsburgh Steel, said his firm gave the USW and its employees more financial information than any other major firm has provided in a labor dispute.

"Certainly there was some risk," he said. "But we had to take it. We couldn't just tell the union 'we have a problem, but we can't tell you what it is.'" The company's incentive pay system had boosted its employment costs about 46 cents above the industry average.

Under the new pact:

1. Certain low incentive rates will be increased.

2. A new incentive base rate scale, designed to eliminate "incentive pay creep," is established.

3. New classified hourly wage rates set for December, 1960, and October, 1961, will be used as guaranteed rates only. Employees making more than the new rates through existing incentives will not receive the full effect of the two future wage boosts contracted for in the steel industry labor pacts.

• **No Increase for Some**—The settlement represents the first time in the USW history that it has permitted a major steel company to deviate so sharply from the Big Steel pattern.

Under the new USW agreement, about half the 8000 unionized workers will pass up pay boosts entirely; about 20 per cent will get the full amount scheduled; and the remainder will get some portion of the increase. (Under the industry contracts, pay will go up 7 to 13 cents per hour in other mills this December.)

USW Rolls Drums For 32 Hour Week

THE TEMPO OF drum beating by the United Steelworkers of America for the 32 hour workweek is picking up.

The USW's 171 member wage policy committee included the proposal in its ten point legislative program presented to Congress last week. You can expect the din to become louder at the union's constitutional convention in September at Atlantic City.

"Reducing the workweek provisions of the Fair Labor Standards Act from 40 to 32 hours per week is now definitely in order so that all people—workers, consumers, and producers—can share more adequately in the fruits of automation," emphasized David J. McDonald, USW president, last week in announcing the legislative program.

• **Ninth on List**—The short workweek proposal, along with the demand for increasing the minimum wage to $1.25, was ninth on the list. Other demands included:

"Implementation" of the full employment program, increasing unemployment compensation benefits, aid for distressed industrial areas, school construction, improved medical care, more housing and public works construction.

The tenth point called for the establishment of a Commission of Continuing Prosperity to function as sort of a national "Kaiser Committee." Like the Kaiser group which was established under last fall's labor agreement, the committee is to be composed of three representatives from labor, public, and management.

Following the wage policy committee meeting, the members called on Congressmen to explain the legislative program in detail.

• **Kennedy Endorsement**—Mr. McDonald also confirmed that Sen. John Kennedy will speak before the USW convention, increasing Washington speculation on whether the Steelworkers will endorse a political candidate this year. Vice President Nixon played a key role by exerting his influence in the steel strike settlement last January.

Here's What's Happening To Credit

- More consideration is being extended to promising marginal accounts.
- Overextending credit as a competitive sales tool is being avoided.
- Tight rein on accounts is being maintained and credit terms are being enforced.
- More financial reports are being required as a condition for extending credit.
- Metalworking failures are rising; collections are becoming increasingly difficult.

GALLOPING credit is being held to its proper pace. With metalworking credit managers at the reins, controls are being exercised at a time when failures are rising and collections are becoming more difficult.

Approaching the far turn of 1960, sales are holding up well but are heavily weighted by lower gross profits and mounting expenses.

Credit men say they favor extending more credit and assuming more risks to help sales, but they want to maintain close controls.

• **What the Odds Are**—Here are the odds reported by Dun & Bradstreet Inc.:

Comparing the first six months of this year with 1959's first half, business failures rose 4.6 per cent. Liabilities were up 23 per cent. For metalworking, the percentages were even higher. Failures (342) were up 15 per cent. Liabilities ($51 million) rose 26 per cent.

Mortimer J. Davis, executive vice president, New York Credit & Financial Management Association, says,"Credit men are watching carefully the relationship between gross profits and expenses on their customers' balance sheets. This is particularly so now, when so many firms are experiencing increased sales, but lower gross profits."

Most credit managers in metalworking regard the balance of 1960 with tempered optimism, says William A. Duval, vice president, National Credit Office. He says:

"They are having to intensify their collection efforts to maintain a proper receivable turnover, while simultaneously assisting their sales departments more to obtain sales."

• **Good Credit Business** — More credit risks are being assumed, Mr. Duval adds, but on a more informed basis as credit men devote more time to promising marginal accounts. Outside sources of information are used more.

Reduction of Federal Reserve interest rates has had little effect on the willingness or ability of manufacturers to borrow, he says. "They continue to rely on suppliers for financial support via extended terms, especially beyond the mill level."

• **Dangerous Pump Priming**—Deploring undue extension of credit as a vehicle for making sales, is Clark Sanford, credit manager, Machinery & Systems Div., Carrier Corp., Syracuse, N. Y.

Financing a customer may help to make the sale, he says, but this is wrong because competition based on nondirect and hidden costs, rather than on product quality, will have to be absorbed.

He urges "uniformity in requiring financial statements, in the establishment of terms, and enforcement of those terms."

• **How the Industry Fares**—Reports from metalworkers show:

• Credit managers of iron and steel producers are "playing ball" with their sales divisions—up to a point. But they continue to hold a tight line on accounts.

On Apr. 1, the iron and steel group ran second among all classifications with 92.9 per cent of accounts current, says the Credit Research Foundation.

• Among service centers the rate is less high. One large jobber reports about 70 per cent of its customers are paying "on the button" (30 days or better). A few years ago, the rate was 80 per cent.

• An Eastern fastener manufacturer reports a tight hold on credit. He reveals that 95 per cent of his customers are discounting their bills.

• Warren H. Kershner, secretary-manager, Credit Management Association of Delaware Valley, Philadelphia, reports collections by steel warehouses and mills have slowed since the middle of February.

• A leading antifriction bearing manufacturer reports that this year 6 to 7 per cent of its customers are requiring more time to pay their bills. He notes a tendency among foreign customers to shop for credit, as well as for price and quality.

New Steel May Double Missile Range

WHEN Rear Adm. W. F. Raborn, head of the Polaris Program, predicted on July 27 that the missile's range would jump from 1200 miles to 2500 within four years, he didn't say how or why. But it's a safe bet that Defense Department planners are counting on the use of weight saving, higher strength metals in addition to better propulsion.

The admiral may have had Rocoloy 270 in mind. Mellon Institute, Pittsburgh, developed it under the sponsorship of the Special Projects Office, Navy Bureau of Weapons. The low alloy steel has a yield strength of 270,000 psi and an ultimate strength of about 325,000. Its chief alloying elements (totaling not more than 8 per cent) are chromium, molybdenum, tungsten, nickel, and cobalt.

"Rocoloy 270 is as much as 50 per cent stronger than steels now being used in the Polaris," claims Dr. G. K. Bhat, head of the Missile Materials Fellowship at the institute. "By using it, fabricators could cut the thickness and weight of a missile motor case in half."

Working under the general supervision of Dr. H. L. Anthony III, a director of research at the institute, Dr. Bhat and his associates devised special tests to prove the properties of Rocoloy 270.

At Mellon Institute, Pittsburgh, D. V. Lindh, research assistant, and Dr. G. K. Bhat (right), head of Missile Materials Fellowships, examine sample of new missile steel, Rocoloy 270. It ruptured during hydrostatic test of its yield strength (270,000 psi)

• **How It's Made**—First, they had specialty steelmakers in the Pittsburgh district turn out production heats of the metal in electric furnaces. The air melt heats were cast as electrodes, which were then remelted in vacuum arc furnaces—a process which greatly reduces columnar structure and causes inclusions to go to the outside of the ingot. Ingots were removed and turned on a lathe until ultrasonic testing showed that surface inclusions had been shaved off.

Clean ingots were then forged into billets and rolled into sheets. Next came evaluation of physical properties — microscopic examination, counting of inclusions, and tests of hardenability and hardness after quenching and tempering. To check mechanical properties and weldability, Dr. Bhat and his associates used bend and tensile tests under various heat treated conditions.

• **Hydrostatic Testing** — Circular pieces 18 in. in diameter were stamped out of the sheets and deep drawn (40 to 50 per cent reduction) into hemispheres or 2:1 ellipsoidal shapes. After heat treating, individual cups were placed in a hydrostatic test device designed to measure their biaxial rupture strength (see photo). A strain gage was attached to the top of the cup and connected by wires to a strain indicator outside the test room. The technique enabled Dr. Bhat to measure the percentage change in resistivity of the strain gage as water was pumped under the cup —thus establishing its biaxial yield strength. Since the cup was locked into the test device by an O-ring, it eventually ruptured.

Although hydrostatic testing is a well established laboratory technique, Dr. Bhat believes that it has not been applied to the measurement of the multiaxial properties of a missile steel.

• **Full Scale Test Awaited**—Rocoloy 270 has not been tried in a Polaris missile, but it has been used to fabricate test vessels with diameters of 6, 12, 18, and 28 in. Currently, most of the tests are being made with 6 in. diameter containers similar to those used in the airborne Falcon missile. "We are confident that we can scale up our results from a 6 in. vessel," Dr. Bhat asserts. "Rocoloy 270 is ready for full scale testing."

New Hassle Looms over 'Buy American'... Congress Eyes Budget Surplus... Canadian Defense Bidders Get Break

A NEW STORM is brewing over the "Buy American" issue in the hydraulic turbine field.

The Office of Civil & Defense Mobilization has already ruled that domestic producers can't get relief from foreign competition for national security reasons. Because of that, foreign manufacturers have won about 40 per cent of the government's hydraulic turbine business in the last two fiscal years.

The ratio could be upset. In the last two months, bids have been opened on six big government contracts —by the Corps of Engineers, Tennessee Valley Authority, and Bureau of Reclamation. One contract has been awarded to a domestic producer, Allis-Chalmers Mfg. Co., even though it was not the low bidder. The contract involved the Corps of Engineers' McGee Bend project. The five others could conceivably go to foreign bidders.

On its four projects, the Bureau of Reclamation hopes to make awards to two U. S. firms because it has not had enough experience with the low foreign bidders to allot all contracts to them. Potential low foreign bidders include Hitachi (Japan) and English Electric Export & Trading Co. Ltd.

On the TVA project, a possible domestic winner has gone overseas itself for 48 per cent of the work covered in its bid.

When the contracts are all awarded, chances are strong that foreign competitors will have boosted their percentage above the 40 per cent of the last two years. That may mean a new appeal to OCDM.

● **IKE FIGHTS FOR HIS BUDGET**—The President appears to be doing his best to protect the surplus of his last budget, that for fiscal 1961. Outlining the latest aggressive acts of the USSR in his message to Congress last week, he nevertheless said: "The Defense Department will carry out . . . defense measures with its available resources insofar as possible." He foresees the chance of a modest increase in defense personnel, maintenance, and operational funds only.

Using money already appropriated by Congress this summer before the recess, the President has agreed to go along with slight increases in the B-70, Army modernization, "spy in the sky," and Polaris programs.

That won't satisfy Congress or please either of the Presidential candidates. Observers look for an attempt in Congress to boost defense outlays significantly by way of a supplementary appropriation, but few expect the President to agree to spend the money made available. To do so at this late date would be to repudiate his eight years in the White House.

● **JOHNSON'S PRIORITIES**—Majority Leader Lyndon B. Johnson (D., Tex.) set these priorities for action by Congress during the current session: 1. Appropriation bills (foreign aid; Health, Educaton & Welfare, Labor, State, and Justice Departments, and public works). 2. The Antarctic Treaty, an agreement among 13 nations to co-operate on research and reserve the area for peaceful purposes. 3. Boosting the minimum wage to $1.25 an hour and broadening the law's coverage. 4. Medical care for the aged.

The Democratic vice presidential candidate is silent on measures given top priority by President Eisenhower: A $600 million program to develop South America, school construction, the farm problem, civil rights, depressed area assistance, highway program financing, increased aviation fuel taxes, a postal rate increase, and removal of the ceiling on interest paid on long term Treasury bonds.

The Democrat's strategy: Pass nothing which might, in the public mind, be credited to the Republican administration's efforts.

● **CLOSER CANADIAN DEFENSE TIES**—The Pentagon has responded to pressure to allow Canadian firms greater access to military contracts involving weapons to be used by both Canada and the U. S. "Buy American" restrictions will be waived when Canadian firms bid for such U. S. military contracts. That puts Canadian firms on an equal plane with U. S. firms. The program further calls for integration of research efforts and access by Canadian firms to U. S. development information.

● **ICC RULES ON GUARANTEED RATES**—The Interstate Commerce Commission has turned down the proposal of two railroads to establish a guaranteed rate on shipments of pipe from Sault Ste. Marie, Ont., to Chicago. The guaranteed rate would have undercut the water route rate significantly. ICC decided it was "unjustly discriminatory, in violation of the antitrust laws, and not shown to be just and reasonable."

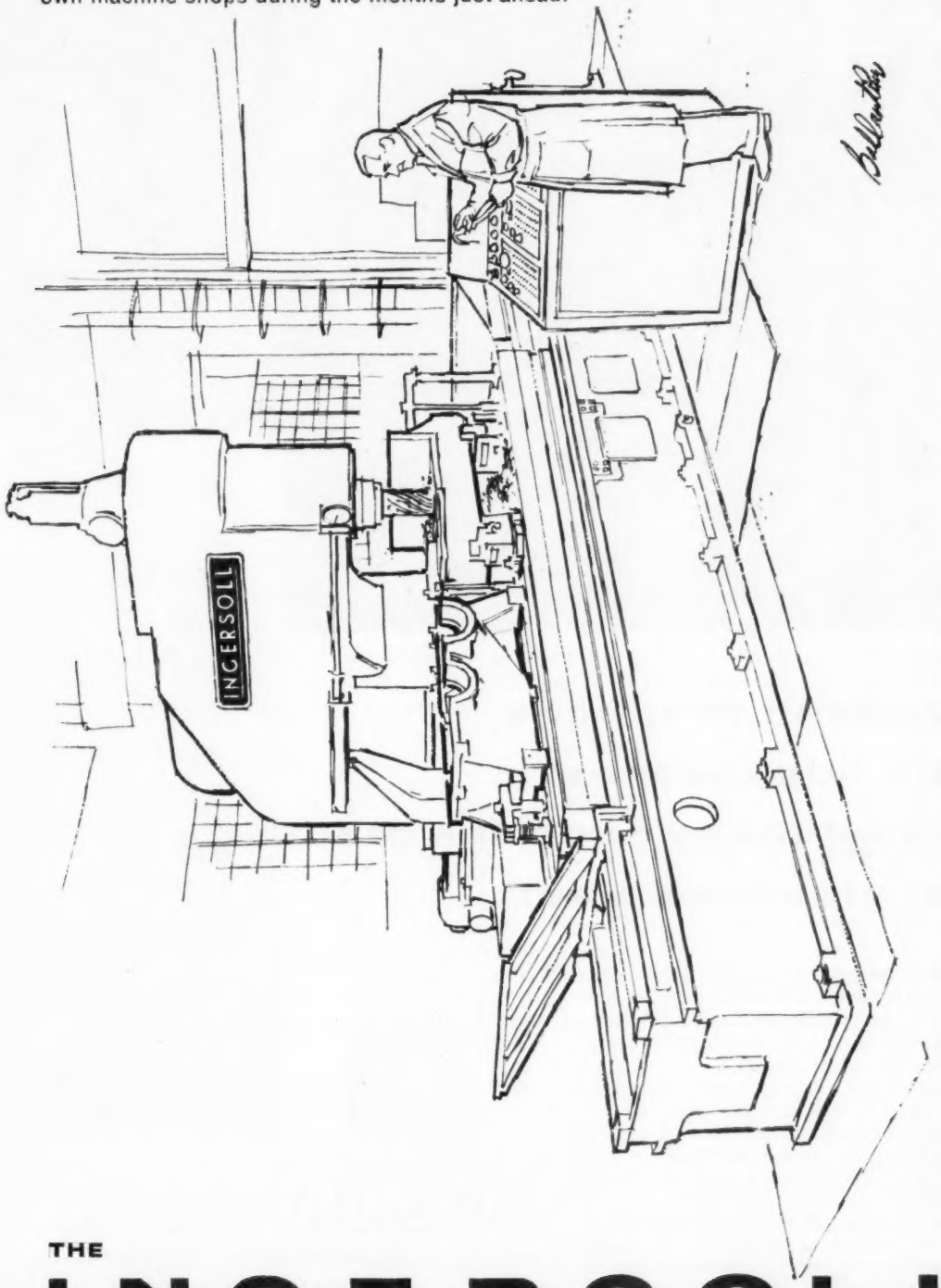
● **CAPITOL NOTES**—The Tariff Commission has found that imports of barbed wire, which are duty free, are not causing or threatening to cause serious injury to domestic producers . . . The Justice Department is bringing suit against St. Joseph, Mo., to keep the city from polluting the Missouri River . . . The Labor Department has issued "Guide for Employer Reporting," a booklet designed to help employers meet requirements of Labor-Management & Disclosure Act.

NEW AT INGERSOLL....

This is one of a number of

NEW INGERSOLL MACHINES

which will be operating on our erecting floors or in our own machine shops during the months just ahead.



A NEW TAPE-CONTROLLED MILLING MACHINE: We are applying tape control to this machine for highly accurate general purpose milling of small, non-repetitive parts. The tape sets the machine's pace and all but eliminates human error. It also increases productivity by enabling the operator to set up work while the machine is milling.

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NEW MATERIALS may be the wonder drugs your company needs. But they are likely to be expensive, demand new working and handling techniques, require special training for workers.

So, like the wonder drugs, you don't use them for every headache —but they can cure special ills or improve over-all corporate health where other, better known, materials have failed.

Let's see why new materials are needed, determine how to find them, and take a look at some of the materials areas that promise big benefits to metalworking.

Why New Materials?

They may be best from a strict cost viewpoint: A. O. Smith Corp., Milwaukee, trimmed the cost of its glass-lined steel silos by using common steel bolts capped with a pressure resistant plastic (to resist corrosive fluids) in place of stainless fasteners.

They can solve special problems: For the J79 engine that powers the B-58 Hustler and the F-104 Starfighter, General Electric Co. needed a thrust bearing that would not soften at temperatures above 700° F and would have a low critical alloy content. The answer: M-50 tool steel. Bearing life is five times longer.

They can give you an unusual combination of properties: Kelsh Instrument Co., Baltimore, needed great rigidity and low weight for its mapping instruments. It found the answer in a new, high strength, aluminum alloy.

They'll help you miniaturize: General Electric uses ceramic-metal discs to make micromodular electronic circuits. A stack of the discs the size of a cigaret will do the work of 44 electronic components. With them, you could build a computer to fit into your shirt pocket.

They'll help you reduce weight: Use of a half ton of titanium in the airframe of the Douglas DC-8 Jetliner permits hauling five extra passengers and their luggage on each of the 5000 flights the plane will make.

They'll meet tough exposure conditions: Solar Aircraft Co. wanted to get more miles from metals in exhaust manifolds and mufflers. Answer: Coat steel with cermets—for high thermal shock and impact resistance, long life.

They'll help when working conditions are foul: National Gas Pipeline Co. needed a steel in the 45,000 to 60,000 psi range that could be welded in subzero temperatures. The answer: GLX-W steels, containing columbium.

They'll permit you to conquer new frontiers: Today's ceramic adhesives can withstand temperatures of 900° F. And where would the space program be without the new, special steels, beryllium, titanium, magnesium, new aluminum alloys?

For those reasons—and many more—you must investigate new materials.

How to Find Them

How to keep abreast of the rapid pace of new developments?

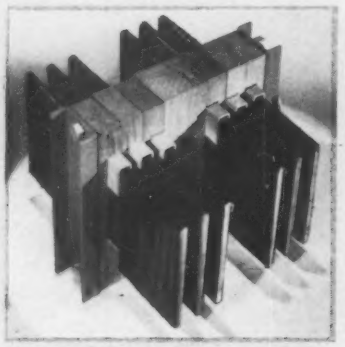
The attack varies from regular

How New Materials Can Trim Costs

BUS DUCT SUPPORTS made by Westinghouse Electric Corp.'s Standard Control Div., Beaver, Pa., are better today than they were three years ago and yet cheaper to manufacture—thanks to new materials.

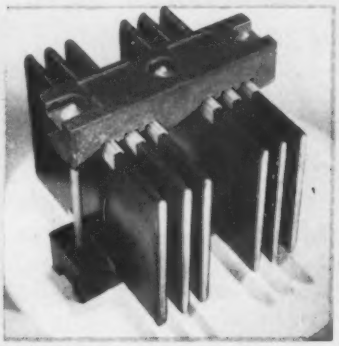
IN 1957:

A typical bus duct support looked like this. Bus bars were held in place by a series of maple blocks, braced with steel channels and clamped together by two high strength bolts. The bars were insulated with an overlapping layer of varnished cambric tape. Micarta buffers prevented abrasion of tape by the blocks. Eight supports were used on a 10 ft section of Westinghouse bus duct.



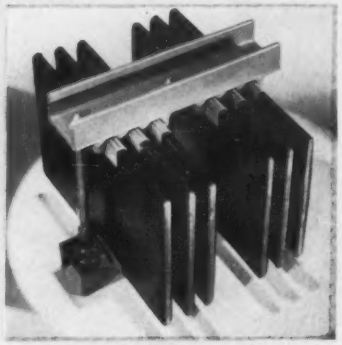
IN 1958:

The blocks, channels, and horizontal bolts were replaced by a pair of grooved, cold molded pieces, and three vertical bolts. Since molded pieces—not bolts—absorb most of the short circuit stresses, high strength bolts were replaced with cheaper carbon steel bolts. Polyvinyl chloride tubing replaced cambric tape insulation. Vinyl replaced micarta for buffers. Material savings: 10 per cent.



IN 1959:

A new material—glass reinforced polyester — replaced the organic compound for the cold molded pieces. Although it costs three times as much per pound as the material it replaced (60 vs. 20 cents) and 15 times as much as the maple blocks, it has compensating advantages: It's lighter, stronger (25 times greater impact strength), and has better electrical properties. Material savings: 10 per cent.



reading of business publications to the use of computers and consultants.

This facet of creative buying has brought about a new staff position —the materials engineer, materials specialist, or materials designer (but he may not be called that). Although he's not a metallurgist, not a chemist, not a physicist, not a mechanical engineer, he has knowledge in those areas and more. He works in design, specifications, purchasing, and testing. He knows processes as well as materials. He finds the right materials for a job, continually reviews standard products to see how new materials can make them better or cheaper.

He must know today's materials cost picture, anticipate what it will be tomorrow. As new developments gain acceptance, their price is likely to drop (though heavy demand may force it up), putting a scratched contender back in the race. For example, General Electric Co. expects to find new jobs for two models of its gallium arsenide tunnel diodes as a result of last month's price cuts from $55 each to $4.50 and from $85 each to $6. Crux: You can't drop a material—not even an old, established one—from consideration on the basis of last year's —or even last week's—information.

Where to Look

The usual sources for material ideas—suppliers, customers, your employees, business publications, technical journals—are a good start. But finding a new material is tougher than making a switch from one standard item to another because you don't always know that a material to meet the specifications exists. Your researchers and engineers may be aware of new developments, even outside their

ADVANTAGES: Because the new support is so much stronger than the 1957 version, seven supports are used in place of eight on a 10 ft section of bus duct, further reducing its cost. Other benefits: 1. Lower inventory. It was necessary to stock the blocks and steel channels in eight sizes to accommodate bus bars of eight widths. With molded supports, the only variable is bolt length. 2. Simplified assembly cuts labor costs, eliminates time lost hunting blocks of the proper size. 3. Freight costs—both incoming and outgoing—are lower.

IN 1960, more changes are being considered. John P. O'Leary, purchasing agent, and James B. Wallace, manager of bus duct engineering, the men largely responsible for past changes, are working on some new ideas. "Since we can't be experts in every field, we lean heavily on the technical competence of our suppliers," says Mr. O'Leary. "We've got to realize material savings to offset constantly rising labor and other costs."

special areas. Suppliers can provide leads. Usually, there is published information on any new material, but finding it can be time consuming. Computers have been programed to search literature. Punched cards, sorted by hand or machine, are used. Superior Tube Co., Norristown, Pa., has set up a punched card system for helping users determine whether required properties can be attained.

John P. Moorhouse, director of purchases, Standard Pressed Steel Co., Jenkintown, Pa., believes material buyers should spend as much time outside the office as inside. An SPS steel buyer, for example, will visit each mill supplier at least once a month. Objective: Learn what the supplier is doing. Is he adding equipment that will give you a new range of sizes or shapes from which to choose? Is he getting ready to offer closer tolerances? Or better finishes? Talk to the supplier's research people. Tell them what you're looking for. Learn whether they're developing any new materials—or methods to upgrade older materials.

What to Look For

Here are some areas in the new materials realm that bear watching:

• **New Forms**—Look for unusual materials to become available in a wider variety of shapes and sizes. Examples: 1. A new hydrostatic press at Sylvania Electric Products Inc., Towanda, Pa., can produce 3000 lb tungsten bars, or bars of less dense alloys in proportionate weights. 2. J. Bishop & Co., Malvern, Pa., is drawing tantalum tubing with outside diameters as small as 0.062 in., with only 0.002 in. wall. 3. Nuclear Metals Inc., Concord, Mass., is using the coextrusion process to form complex shapes of composite metals, controlling the relationship of inner and outer materials. 4. Cold working has helped to make forming of some rarer materials practical and improving their properties at the same time.

• **Higher Purity** — Scientists are learning that minute traces of one material in another—long neglected because they were hard to measure (or even find)—can have marked effects on physical properties. So they're now devising processes and equipment to obtain high purity metals. Merck & Co.'s Electronic Chemicals Div., Danville, Pa., has combined vacuum processing with floating zone refining to reduce impurities in silicon nearly to the vanishing point (STEEL, Dec. 28, 1959, p. 82). Contamination is reduced to as little as 1 part in 10 billion—"a teaspoonful in a 100-car trainload," says Merck.

• **Clad Metals** — The variety of these versatile combinations is increasing rapidly. Texas Instruments Inc.'s Metals & Controls Div., for example, introduced some 100 combinations last year. They can trim costs and solve problems where you need one set of properties on one side, another set on the other (Example: Corrosive chemicals on the inside, weather on the outside). To solve severe abrasion problems, Jessop Steel Co., Washington, Pa., suggests tool steel clad plates. One maker of compact cars is reportedly considering stainless clad bumpers. Simoniz Co., Chicago, claims its new Clad-Rex 102, vinyl-metal laminate can be worked with conventional metal forming equipment to severe configurations and can be exposed to high temperatures.

• **Exotic Metals**—Look for exotic metals to garner some commercial applications as a result of nuclear and space activities. The glamour uses have illustrated the need for facilities to work exotic metals in larger sections; the equipment developed can be put to work in civvies too. These metals may help you where you need a heavy material (uranium), a light material (beryllium), a reactive material (calcium), an "almost - metal" (boron).

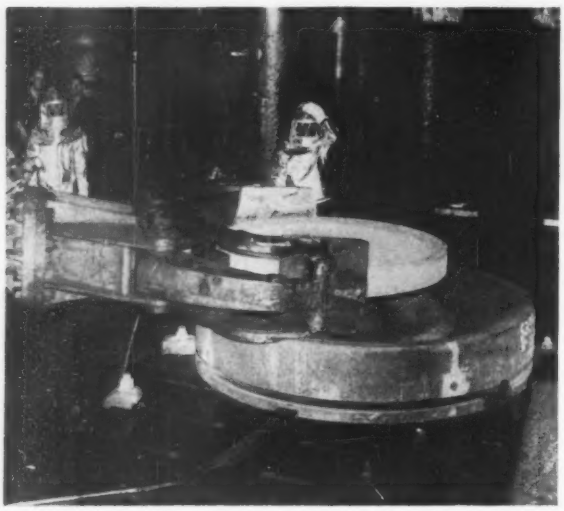
• **Refractory Metals**—Look for refractory metals to gain more importance. Take tungsten. With a melting point of nearly 6100° F, it has long been used for filaments in vacuum tubes, as the coil in electric light bulbs, as a target material for x-ray tubes. Now it's being used to withstand the heat of rockets and jets. It's also employed as an alloying element to produce high density metals. And it's becoming available in a wider range of shapes and sizes. Convair Div. of General Dynamics Corp., has even made experimental tungsten extrusions on its Dynapak, a high energy rate forming method.

Another refractory metal, chromium, is getting attention from scientists at the Bureau of Mines. They've found that improving its purity gives it higher ductility. So a pure chromium wire may be possible.

• **Refractories**—Expect more refractory lab ideas to be turned into pro-

New Materials Bring New Production Techniques . . .

SOLVING SPACE AGE problems with Space Age materials may require Space Age production techniques. Example: Production of a giant, beryllium heat sink by Aluminum Co. of America's Cleveland Works and Brush Beryllium Co., Cleveland, for McDonnell Aircraft Corp., St. Louis—prime contractor for Project Mercury, the man-in-orbit program of the National Aeronautics & Space Administration.



The giant but gentle hand of a huge manipulator pulls a steel die (heated to 1000° F) from a furnace. The die, made by Alcoa, was used to forge a 62 in. diameter, beryllium billet. The billet was produced by Brush's patented, QMV, powder metallurgy process—involving simultaneous application of vacuum, heat, and pressure to beryllium powder

Workmen in aluminized suits remove the saucer shaped, beryllium disc from the die after it was forged on a 50,000 ton press. The forging is 80 in. in diameter and 3 in. thick. Brush will finish machine the piece to 74 in. in diameter and 1 in. thick. The heat sink is designed to protect the manned space capsule from the tremendous heat that will be generated during re-entry

duction realities. They're generally costly but will solve knotty problems. Some (silicon carbide, for example) are conductive at high temperatures. Some (molybdenum silicide, for example) tend to be brittle at room temperature but get tougher as they get hotter. Another, pyrolytic graphite, has unusual directional properties.

• New from Old—Designers are driving to develop new ways to use older materials. Object: Solve Space Age problems—which are not confined to space hardware. For example, STEEL has been told that ceramic bearings for high temperature applications are possible. And high speed steel is being drafted from cutting tool jobs as a potential bearing material. Makers of glass, plastics, ceramics, and other nonmetals are fighting for your attention. And designers are looking to new variations of old materials to solve common problems. The New York Central Railroad, for example, is using radioactive isotopes for preventive maintenance. A radioactive material is used as part of the piston rings; a sample of lubricating oil is taken regularly and its radioactivity is checked. Knowing the volume of oil used, the scientists can determine the stage at which serious wear occurs and keep engines running until a teardown is indicated.

It Pays Off

Just as wonder drugs save lives, the wonder materials can salvage markets. Admittedly, your first step is to check the possibility of design changes that might permit more efficient use of standard materials. But don't overlook the benefits new materials offer.

Few of the new materials are at the stage where tonnage production pays off in low costs—usually they're cheap when they're needed, expensive when they're not.

Materials Efficiency

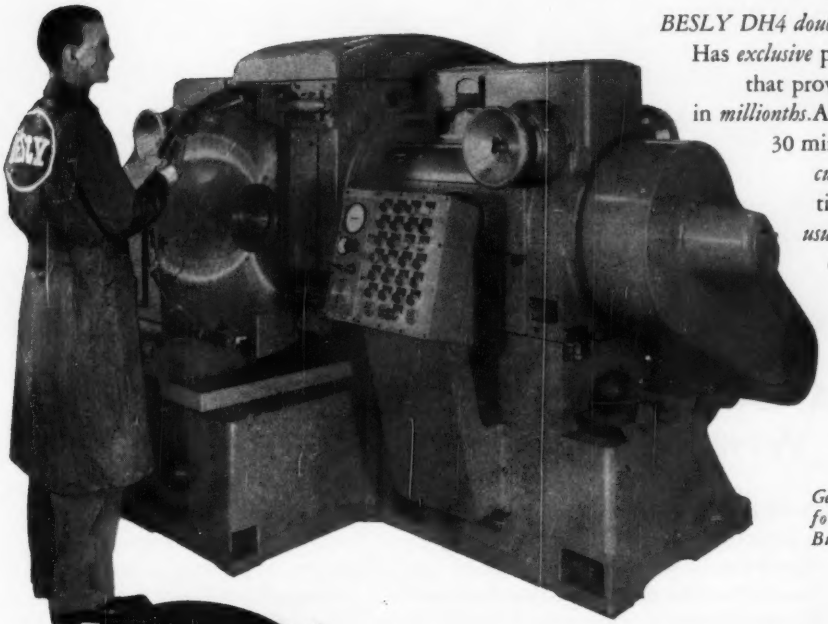
Pick the Right Material

That's the topic of the article coming up Aug. 29 in STEEL's 1960 Program for Management. For a free copy of any or all articles in this 13 part series on materials efficiency (which started July 4 and will run every other week for the rest of the year), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. Also available is the companion series, on production efficiency, which appeared during the first half.

Tool bit squared to ±.001 inch!

Hardened (63 Rockwell, C scale) high-speed steel tool bit, 4" x ½" x ½", was finish ground on four sides in a BESLY DH4 grinder at rate of 600 pieces per hour. Size was held to ±.001", parallelism (square across corners) to .001". Stock removed was .012 per side (.024 per pass). The tool bits distorted by heat treatment, are quickly trued up by the twin discs of the grinder.

If your grinding equipment can't turn out such results...**Better see Besly!**



BESLY DH4 double horizontal spindle disc grinder. Has *exclusive* precision quill and clutch infeed that provides feed increments calibrated in *millionths.* Abrasive discs can be changed in 30 minutes without disturbing setup, *cutting downtime in half.* Dressing time is only four minutes, *⅕ the usual time!* Simplified push-button operation and controls, built-in dials, gages and meters to indicate abrasive conditions, movement and alignment; motor load, etc., assure precise results, dependable grinding production.

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Replacement bearings available through United Motors System and its authorized bearing distributors.

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IN ROLLER BEARINGS HYATT IS THE WORD FOR GM GENERAL MOTORS RELIABILITY

Powder Metal Gains Favor in Autodom

HOW IT GROWS

	Millions of pounds used in autos	Pounds per car
1970*	115.2	16.0
1965*	57.1	8.4
1960	28.3	4.5
1955	25.2	3.2
1950	17.3	2.6
1946	4.4	1.9
1940	4.5	1.2

*Projected. Figures based on industry estimates of average use per car.

WHERE IT GOES

Typical car distribution

Engine	35.5%
Suspension	25.7
Steering	13.8
Transmission†	9.6
Accessories	8.5
Brakes	5.1
Electrical	2.3

†Includes 1.6 per cent for torque converter. Based on Chrysler Corp. vehicles.

AUTOMAKERS can double their consumption of powder metal parts in the next five years, but the powder metal industry will have to do a better job of promoting its products, says Roy Blue. He's chief engineer, Amplex Div., Chrysler Corp., and the new president of the American Powder Metallurgy Institute.

Design engineers tend to think of powder metals as being good only for bearings; psychologically, it's difficult to convince designers that powder metal products can be as strong as parts made by other processes, says the industry.

But powder metal makers plan to correct that thinking. Charges Mr. Blue: "Probably our largest stumbling block has been the industry's inability to supply design engineers with dependable data because of lack of standardization. Samples that have proved satisfactory on test have turned out to be less than satisfactory in production. We must be able to supply information and service when it's needed.

"The time to plan for production of powder metal parts is in the early design stages. Once a prototype assembly is established, it's too late to get the generous radiuses, wall thicknesses, chamfers, and other dimensions we require to produce the part economically."

• **Can Cut Costs**—Like many processes, parts produced from powder metals can cut costs if you design for the method and if you don't underestimate strength, fatigue, and impact requirements. Although the raw material costs more than most metals, cost advantages come in low tooling costs for volume production, less tool maintenance, and shorter tooling leadtime. Secondary machining operations can be eliminated or reduced to a minimum. Material losses are minimal. The parts can be produced to close tolerances in the forming process. Semiskilled labor can be used.

• **Examples**—"In the past, it was believed that powder metals couldn't compete with screw machine parts, but we're now making a brake spacer at a 20 per cent saving in unit price. In addition, it's more uniform dimensionally and we've eliminated assembly problems that cropped up with the screw machined part," says Mr. Blue.

The transmission kickdown lever is another part that's being made at lower cost from ferrous base, powder metals. "It's subjected to severe fatigue stress, but it has met all the performance requirements as well as or better than when it was extruded from aluminum," Mr. Blue asserts.

Amplex Div. helped pioneer powder metal use in automobiles in the late twenties when it developed a heavy duty, self-lubricating, bronze, pilot bearing for clutches. Bearings in use had failed or become

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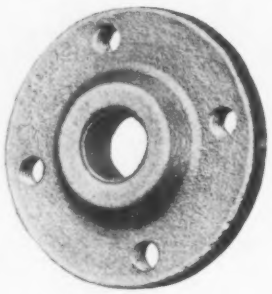
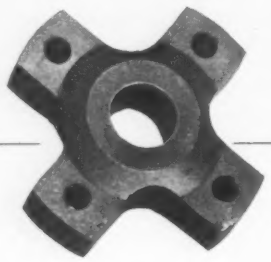
Powder Metal in Autos

OLD WAY



5½"

NEW WAY



WHAT IT SAVES

Chrysler's Amplex Div. used to make this water pump fan pulley housing from cast iron. Redesigned for ferrous base, powder metal, the new part weighs 30 per cent less, saves 7 cents per unit even though material costs are higher. Here's where costs have been cut:

Machining	**16 per cent**
Tooling	**8 per cent**
Direct labor	**5 per cent**
Leadtime	**2 per cent**
Material losses	**2 per cent**
Total savings	**33 per cent**

noisy because they couldn't be lubricated after assembly. Further development phases extended to spacers, striker plates, and similar parts where bearing properties were a factor. That was followed by the development of structural and functional parts, such as oil pump rotors and gears, cams, spacers, and fuel filters.

Chrysler now uses 96 different powder metal parts in its cars; GM uses about the same number; Ford has slightly fewer. The number of automotive applications has increased from 50 to 100 in the last ten years. GM makes parts at its Moraine Products Div., Dayton, Ohio, and at Delco-Remy Div., Anderson, Ind. Ford has a powder metal department at its Rawsonville, Mich., accessory plant.

Advances in the art aim at producing larger and more complex parts to closer tolerances. Amplex has made powder metal bearing stock (not for cars) weighing more than 200 lb. It has made gears weighing up to 5 lb. Helical gears, difficult to press out because of complicated forms, now are made with a 6 degree pitch. Amplex believes it can make them up to 22 degrees if necessary.

• **Process**—Three basic steps are involved in making powder metal parts. Powders are blended in hoppers. Die lubricants are added and the mixture is compressed in a die at pressures ranging from 20,000 to 200,000 psi. The green briquets are sintered in a controlled atmosphere furnace. They look like wrought iron. For extremely close tolerances and added strength, parts can be resized or coined, then resintered. Finish machining can be done if necessary.

Amplex is using iron powders, sometimes mixed with copper or copper and carbon, for transmission and engine parts that receive high impact and fatigue loads. The parts formerly were made from pearlitic, malleable iron. Adds Mr. Blue: "The time has arrived when we will be specifying iron base alloys comparable to SAE 4600 or 8600 steel with improved hardenability, higher load carrying capacity, and improved wear resistance. We can look forward to the use of higher alloy content materials. What we need are improved processing methods to provide mechanical and physical properties comparable to those of high strength alloy steels."

Exhaust Notes

• The U. S. Army Ordnance District, Cleveland, has awarded $9.7 million worth of contracts to Willys Motors Inc. for 5228 vehicles. The Post Office Department awarded another contract to the firm for 3210 mail trucks.

• It's reported in Detroit that Chevrolet Div. is attempting a rush tooling program to bring out another compact for the 1962 model year. Rumors vary as to whether the car will be larger or smaller than Corvair.

• Oldsmobile Div., General Motors Corp., will build a 232,000 sq ft engineering building in Lansing, Mich. Projected completion date is early 1962.

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
7 Mo. Totals	4,243,955	3,839,422
August	.....	239,149
September	.....	258,151
October	.....	507,527
November	.....	254,527
December	.....	494,931
Total	.....	5,593,707

Week Ended	1960	1959
July 9	89,769	123,147
July 16	105,113	127,502
July 23	112,179	124,446
July 30	107,019	122,518
Aug. 6	104,046†	108,240
Aug. 13	80,000*	72,603

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

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N/D Introduces New Heavy-Duty Cost-Cutting Conveyor Ball Bearing!

Now you can cut conveyor operating and assembly costs substantially with the *new* heavy-duty N/D conveyor roll ball bearing.

This durable N/D precision ball bearing for conveyors incorporates an exclusive integral seal combination—a new, highly efficient Land-Riding Seal and a performance-proved Sentri-Seal. Its minimum torque seal combination shuts out both moist and dry abrasive contaminants . . . and seals in bearing lubricant for life.

This high performance bearing helps cut manufacturing assembly time . . . and helps reduce field assembly costs. These modern design N/D ball bearings require no outmoded separate seal closures, lubricant plumbing, adjusting nuts, springs or collars . . . they're virtually maintenance free!

N/D sealed ball bearings are interchangeable with other type bearings and mount directly on commercially available rolled shafting. Install a few in your conveyor section . . . then compare the reduced maintenance costs to other type bearings requiring constant relubrication. The results will be convincingly in favor of N/D integrally sealed ball bearings . . . year after year!

For additional information call your N/D Sales Engineer, or send today for the new N/D Heavy-Duty Conveyor Ball Bearing Bulletin. Write New Departure Div., General Motors Corp., Bristol, Conn.

Replacement ball bearings are available through United Motors System and its Authorized Bearing Distributors.

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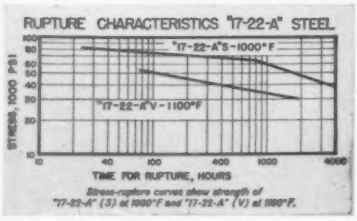
BALL BEARINGS
proved reliability you can build around

High alloy performance with Timken® low alloy steel



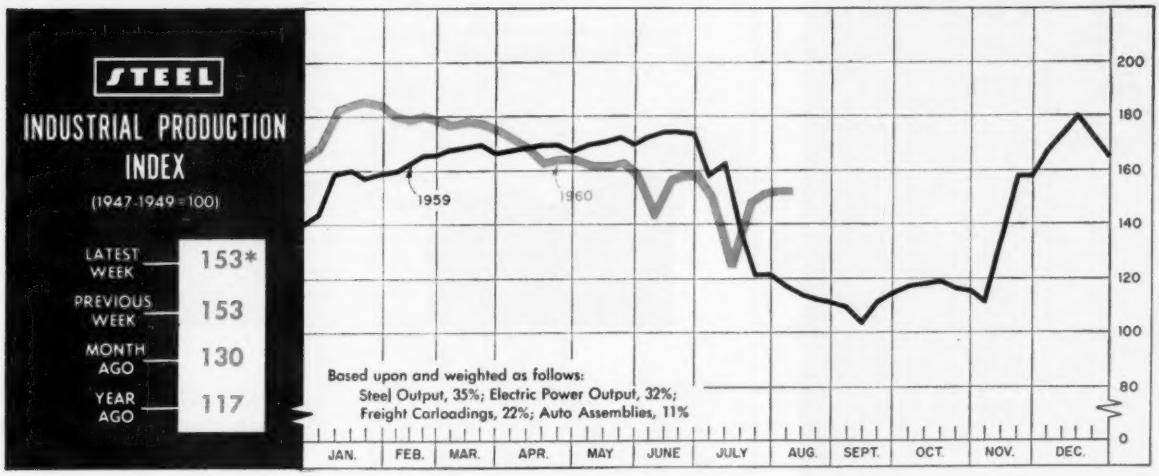
Stress-rupture curves show strength of "17-22-A" (S) at 1000°F and "17-22-A" (V) at 1100°F.

You keep maximum strength up to 1100°F. If you are using expensive, high alloy steels for missile engine parts, aircraft brakes, gas turbines or other high temperature applications, try Timken® *low* alloy "17-22-A" steels. On less than 3% alloy content, you get high alloy performance—with maximum strength up to 1100°F.

Besides cutting your initial costs, Timken "17-22-A" steels have high resistance to heat checking and thermal cracking. They are readily workable up to 2300°F. and are easily machined and welded. In fact, maximum high temperature properties can be developed by normalizing and tempering. You practically eliminate the chance of distortion and quench cracking.

Want more details on this money-saving steel? Send for Technical Bulletin 36B. And let our metallurgists help solve your high temperature steel problems. They've solved thousands already. ***When you buy Timken steel you get:*** *1) Quality that's uniform from heat to heat, bar to bar, order to order. 2) Personal attention from the experts in specialty steels. 3) Over 40 years' experience in solving tough steel problems.* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

Timken Alloy Steel and Seamless Steel Tubing are available from Steel Service Centers in 44 cities in the United States.



*Week ended Aug. 6.

Backlogs Mirror Underlying Strength

IF YOU want to build up a fairly good case in favor of a sound economy, isolate the statistics for the primary metals industries from the rest of durable goods manufacturing. You'll find what appears to support the idea that most of the uncertainty about today's business is caused only by the declines in steel, copper, aluminum, and other basic metals.

• **Backlogs Typical**—Much concern about dwindling backlogs has been voiced lately. Two points are usually made: 1. They haven't returned to the level of previous periods of prosperity. 2. They have declined for eight consecutive months. In answer to the first point, it should be apparent by now that unfilled orders are not likely to reach the abnormally high levels of 1952-53, and maybe not even those of 1956-57, until perhaps the mid-'60s. Our capacity and productivity have increased more rapidly than our demand.

In the case of the decline, the figures can be misleading. It is true that total manufacturing backlogs have dropped 7.7 per cent since the last peak in October. And durable goods unfilled orders have slumped even more—8.5 per cent. But take out primary metals, and the decline for all other durables is only 3.5 per cent. Backlogs for those industries have held practically constant since March.

• **Out of Focus**—To find the reason for this disparity, you have to go no farther than last year's labor problems in the primary metal industries. The tendency is to put the blame solely on the steel industry. But the copper and aluminum industries too had labor difficulties during which backlogs piled up.

• **Calling the Trend**—In the last decade, unfilled orders were fairly accurate indicators of the business cycle. After peaking out in January, 1953, they took a steep tumble into

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,556[1]	1,537	335
Electric Power Distributed (million kw-hr)	14,700[1]	14,746	13,675
Bituminous Coal Output (1000 tons)	8,185[1]	7,945	7,239
Crude Oil Production (daily avg—1000 bbl)	6,820[1]	6,821	6,789
Construction Volume (*ENR*—millions)	$561.7	$365.5	$416.3
Auto, Truck Output, U. S., Canada (*Ward's*)	118,539[1]	131,520	119,689
TRADE			
Freight Carloadings (1000 Cars)	620[1]	614	532
Intercity Truck Tonnage (changes from year ago)	−2.4%	−1.2%	+12.3%
Business Failures (Dun & Bradstreet)	293	259	252
Currency in Circulation (millions)[3]	$32,044	$32,041	$31,922
Dept. Store Sales (changes from year ago)[3]	+1%	+3%	+6%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$27,254	$26,123	$24,139
Federal Gross Debt (billions)	$288.3	$288.9	$288.5
Bond Volume, NYSE (millions)	$24.0	$22.7	$28.0
Stocks Sales, NYSE (thousands of shares)	12,844	13,864	12,768
Loans and Investments (billions)[4]	$104.7	$105.3	$104.2
U. S. Govt. Obligations Held (billions)[4]	$27.3	$27.4	$30.2
PRICES			
STEEL's Finished Steel Price Index[5]	247 82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	231.1	233.2	217.4
All Commodities[7]	119.5	119.5	119.2
Commodities Other than Farm & Foods[7]	128.4	128.3	128.2

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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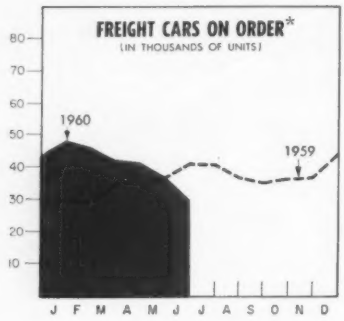
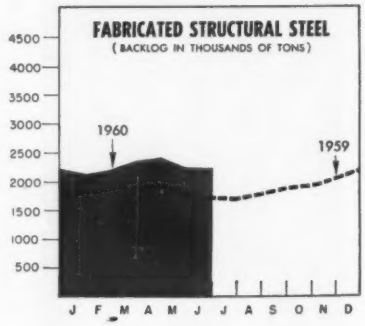
THE BUSINESS TREND





	Domestic Awards		Backlogs (end of month)	
	1960	1959	1960	1959
Jan.	7,149	4,102	48,170	29,470
Feb.	3,411	1,842	46,323	28,789
Mar.	1,959	10,782	42,131	35,487
Apr.	5,551	3,736	41,003	35,479
May	2,234	5,253	36,106	36,869
June	321	8,369	29,555	40,973
July	....	4,159	.....	40,309
Aug.	....	1,653	.....	37,172
Sept.	....	943	.....	35,626
Oct.	....	2,722	.....	36,199
Nov.	....	2,424	.....	36,555
Dec.	....	10,560	.....	43,870
Total	....	56,495		

*Domestic only.
American Railway Car Institute.

	Shipments		Backlogs	
	1960	1959	1960	1959
Jan.	209.0	224.3	2,116	1,794
Feb.	240.9	216.1	2,189	1,864
Mar.	277.0	260.5	2,364	1,873
Apr.	286.9	290.6	2,401	1,922
May	284.6	294.1	2,237	1,768
June	332.7	365.4	2,219	1,717
July	....	238.6	....	1,679
Aug.	....	220.4	....	1,772
Sept.	....	182.6	....	1,871
Oct.	....	195.3	....	1,891
Nov.	....	180.8	....	2,068
Dec.	....	235.7	....	2,195
Total	....	2,904.4		

American Institute of Steel Construction.

Charts copyright, 1960, STEEL.

the recession that began eight months later. They rose with the general upswing in the second half of 1954. They peaked again in late 1956 and started down in January, 1957. The recession started the following September. Once again they leveled out and began a slow rise concurrent with the general economic recovery.

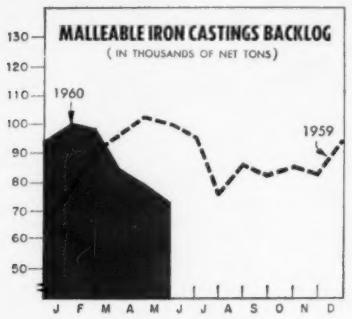
There hasn't been a significant peak since 1956. If we disregard the effects of primary metal backlogs, the latest high point occurred in July, 1959, not too far above the recession low. It's possible that the 3.5 per cent dip since then was a preliminary to the "rolling adjustment" we seem to be in now, or even a preliminary to the recession some observers are forecasting for next year.

Despite the over-all stability, there is no question that some industries are either in their own little recessions right now or are facing one if orders don't pick up in the near future. The four charts on Pages 66 and 67 illustrate this point. Backlogs in the foundry industries have been falling for several months as producers clean out the order files. Railroads and freight carbuilders are laying off workers as orders and backlogs slump. Shipments in the fabricated structural steel industry continue to lag shipments and backlogs are once again shrinking.

• **Outlook Improving** — But the chances are good that the total economy is simply in a period of unusual stability with a change for the better in the future. For one thing, among the scores of midyear reports issued in the last month, those which show an upturn in backlogs outnumber their opposites 4 to 1. Improvements range from as much as 1 or 2 per cent to upwards of 80 per cent. Declines were of a much smaller magnitude.

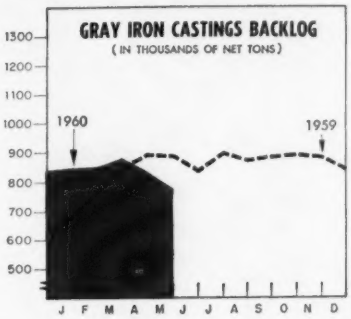
Another plus value is the fact that new orders for durables other than primary metals are holding near their postrecession high. (The declines in both total sales and total new orders for manufactures also have been caused almost entirely by the primary metal industries.) If the steel industry improvement in the next five months is greater than seasonal, new orders will likely rise above shipments again, and backlogs will begin a gradual rise.

With that improvement and a continuation of the strength in the nondurables sector of manufactur-



	Shipments 1960	Shipments 1959	Unfilled Orders* 1960	Unfilled Orders* 1959
Jan.	83.2	75.2	100.3	77.3
Feb.	83.1	74.7	98.3	90.3
Mar.	86.2	84.3	84.7	95.8
Apr.	71.3	91.0	79.2	102.5
May	68.9	83.5	73.2	99.9
June	...	85.5	...	95.3
July	...	69.2	...	75.3
Aug.	...	65.1	...	85.9
Sept.	...	76.1	...	82.3
Oct.	...	75.5	...	85.0
Nov.	...	58.2	...	82.6
Dec.	...	80.1	...	93.9
Total	...	916.4		

*For sale. U. S. Bureau of the Census.



	Shipments 1960	Shipments 1959	Unfilled Orders* 1960	Unfilled Orders* 1959
Jan.	1,136	1,002	851	687
Feb.	1,108	1,037	855	767
Mar.	1,143	1,205	880	847
Apr.	1,051	1,246	834	892
May	1,052	1,236	779	885
June	....	1,252	...	837
July	....	933	...	898
Aug.	....	743	...	873
Sept.	....	850	...	883
Oct.	....	872	...	887
Nov.	....	831	...	885
Dec.	....	1,108	...	846
Total	....	12,315		

*For sale. U. S. Bureau of the Census.

ing, there is good reason to believe that the economy as a whole will enter 1961 at a near record level.

STEEL's Index Levels Off

In leveling off during the last couple of weeks, STEEL's industrial production index is following a pattern that has prevailed in every year (except those interrupted by a steel strike) since 1954. The decline in automotive production due to model changeover is so great that it completely cancels seasonal upturns in output of electricity and railroad freight carloadings and a mild improvement in steel operations. At a preliminary 153 (1947-49=100), the index is about as high as it will go until new model production is well underway in late September.

Almost all carbuilders are into the changeover this week. Chevrolet, Oldsmobile, and Cadillac divisions of General Motors Corp. and Ford and Falcon divisions of Ford Motor Co. accounted for most of last week's production. Chrysler Corp. divisions were starting up, but they won't contribute much strength until this week. The last makes to close out 1960 production will be Thunderbird and Lincoln sometime in early September.

Unless sales on new cars perk up in the next four to six weeks, don't be surprised if the '61 model buildup is slower than scheduled at present. July sales were 1.5 per cent beneath the year-ago level, says *Ward's Automotive Reports*. As a result, inventories inched up to 1,062,800 units, not counting imports.

Trends Fore and Aft

- New orders for industrial supplies edged up a point to 197 (July, 1948 =100) in June, reports the American Supply & Machinery Manufacturers' Association Inc. It was the second consecutive monthly advance.
- Orders for foundry equipment in June reached the highest point since March, 1959, registering 164.8 per cent of the 1947-49 average. It too was the second consecutive monthly gain, says the Foundry Equipment Manufacturers Association.
- Contract awards for heavy construction in early August show promise of putting that industry back on the record-bound track. They totaled $561.7 million in the week ended Aug. 4, bringing the year-to-year gain up to 9 per cent.

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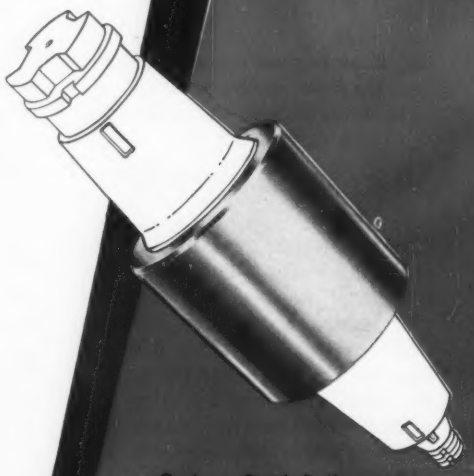
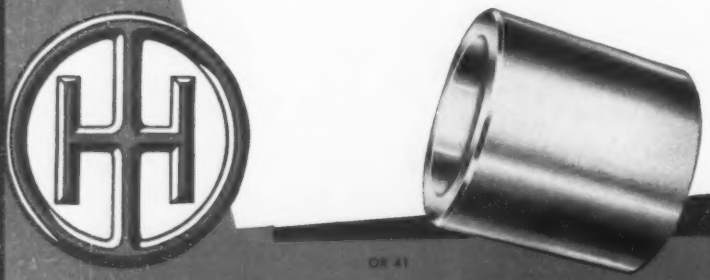
Ohio back-up roll body sleeves are forged and hardened from *balanced alloy vacuum poured degassed steel.* These sleeves are accurately machined and applied to either new or used forged steel or cast steel arbors.

Yes, Ohio Steel offers a complete back-up roll service. Ask your Ohio roll sales engineer about this modern facility that can help increase rolling mill efficiency.



- Carbon Steel Rolls
- Ohioloy Rolls
- Ohioloy "K" Rolls
- Flintuff Rolls
- Double-Pour Rolls
- Chilled Iron Rolls
- Denso Iron Rolls
- Nickel Grain Rolls
- Special Iron Rolls
- Nioloy Rolls
- Forged Steel Rolls



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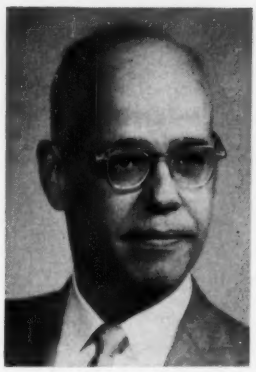

ROBERT GARMEZY
heads Blackstone research

EVANS JASPER
Manco Mfg. pres.

GRAEME B. SUPPLE
gets development post

New Jersey Zinc Co., New York, has elected **James R. Alexander** vice president-sales. He succeeds **Robert G. Kenly** who assumes new administrative duties. Mr. Alexander was vice president-sales for Thermoid Div., Trenton, N. J., H. K. Porter Company Inc.

Kasle Steel Corp., Detroit, has named **Robert Kasle**, vice president-sales manager; **John Brown**, assistant vice president-sales manager; **Herbert Ockenfels**, assistant vice president-assistant sales manager; and **Leonard Trunsky**, assistant sales manager. Messrs. Kasle, Ockenfels, and Trunsky are in Detroit, Mr. Brown in Grand Rapids, Mich.

Howard Bolton was made manager, Washburn Street plant, **Harrison Radiator Div.**, General Motors Corp., Lockport, N. Y. Succeeding Mr. Bolton as manager, inspection and quality control, was **Bernard L. Howe.**

Appointed purchasing agent and inventory control manager, **Bradley Semiconductor Corp.**, New Haven, Conn., was **Robert A. Brothers.** He was planning manager, Waterman Big Pen Corp. **Francis H. Callahan Jr.** was named chief industrial engineer.

James H. McGarry was appointed director - manufacturing, Mechanical Div., **General Mills Inc.**, Minneapolis. He was general manager-manufacturing for the company's Federal Div.

Robert Garmezy was chosen director-engineering, Automotive Div., **Blackstone Corp.**, Jamestown, N. Y. He will direct design, research, and development activities.

John P. Lacke was made resident manager, **American Zinc, Lead & Smelting Co.**, St. Louis. He was general superintendent, Vinegar Hill Div. **Paul F. Mills** was appointed mine superintendent.

C. F. Skoog was named superintendent, **Kaiser Aluminum & Chemical Corp.'s** coke calcining plant, Gary, Ind., scheduled for completion this fall. Mr. Skoog was technical supervisor-maintenance at the company's Baton Rouge, La., alumina plant.

Thomas Electric Welder Co., Lynn, Mass., has promoted **C. Dana Moore, John C. Grant Jr.**, and **George R. Grant** to executive sales positions. Mr. Moore is sales manager, John Grant, assistant sales manager, and George Grant, factory sales engineer.

Named quality control manager, **National Can Corp.'s Central Div.**, Chicago, was **Charles G. Wemlinger.** Appointed assistants to **W. I. Colvin**, San Francisco division manager, were **Joseph P. Satariano** and **Walter E. Sullivan.**

Named manager of **National Can Corp.'s** Baltimore, Md., plant was **I. Martin Long.** He succeeds **L. D. McEvoy**, made supervisor of training, Atlantic Div.

Evans Jasper was appointed president, **Manco Mfg. Co.**, Bradley, Ill., moving up from vice president. He continues as president of Manco's subsidiary, Timberline Equipment Co.

Named director of product development, air conditioning systems, Industrial Div., **American Radiator & Standard Sanitary Corp.**, Detroit, was **Graeme B. Supple.** He was on the staff of the vice president-marketing, in charge of planning and development.

Richard D. Odle was named manager, stainless steel and alloy operations for all yards in this country and Canada for **Luria Bros. & Co.**, New York, a division of Ogden Corp. He will be in Pittsburgh. He was with Tube City Iron & Metal Co.

John J. Morrissey was chosen manager, **Dana Corp.'s** Marion, Ind., Div. He was vice president-general manager, General Drop Forge Corp., Dana subsidiary in Buffalo.

John W. Carlson was made assistant general manager, **Allis-Chalmers Construction Machinery Div.**, Allis-Chalmers Mfg. Co., Milwaukee. Succeeding Mr. Carlson as general manager, Deerfield Works, was **James B. Codlin**, formerly chief engineer there.

Mesta Machine Co., Pittsburgh, has named two assistants to the executive vice president. They are

J. R. BRASHEARS
Hoover Ball gen. mgr.

D. E. STINGEL
Union Carbide mgr.

HERBERT V. CORK

ROBERT S. KOCOUREK
Foote Bros. appoints new managers

Henry B. Grant and **William J. Weir.**

J. R. Brashears has been named general manager of the new **Hoover Ball Div.** into which Hoover Ball & Bearing Co. has consolidated all ball manufacturing, engineering, sales, and administrative functions at Middletown, Ohio. **C. E. Bowman** was appointed assistant general manager and **H. E. Smith** sales manager.

John R. Mueller was named general manager of chain and sprocket operations, **Borg-Warner Ltd.**, subsidiary in England, Borg-Warner Corp., Chicago. Mr. Mueller remains vice president-engineering, Morse Chain Co., a U. S. subsidiary.

Made assistant chief metallurgist at **Bethlehem Steel Co.'s** Lackawanna, N. Y., plant was **Clarence E. Morey.** He succeeds **Silas M. Brown,** named assistant chief metallurgical engineer at Bethlehem headquarters, Bethlehem, Pa.

American Air Filter Co., Louisville, has made **Charles S. Stock**, manager of central marketing. Succeeding Mr. Stock as manager, School Air Systems Div., was **Frank K. Platt**, former assistant manager. **A. B. Ullrich Jr.** was named manager, Engineered Systems Div.

William H. Painter was chosen vice president, **Semiconductor & Materials Div.**, Somerville, N. J., Radio Corp. of America. He will direct the operations planning group. He was manager-administration for RCA's Electron Tube Div., Harrison, N. J.

D. E. Stingel was appointed works manager, **Union Carbide Metals Co.**, division of Union Carbide Corp., New York. He was vice president, Carbide Power Co. and production manager, Union Carbide Olefins Co.

Named purchasing agent for **Horace T. Potts Co.**, Philadelphia, was **R. A. Neeley.** He succeeds **John H. Kern,** transferred to sales department.

Named executive vice president of **Mueller Co.**, Decatur, Ill., was **Jackson Kemper.** He succeeds **W. H. Hipsher,** resigned. Mr. Kemper was vice president-general manager, Forge & Fittings Div., H. K. Porter Company Inc.

Daniel Parker, son of retired board chairman **Kenneth Parker, Parker Pen Co.**, Janesville, Wis., was named president. The elder Mr. Parker's nephew, **George Parker,** was chosen executive vice president, succeeding Daniel Parker.

Thomas H. Havir was made sales manager, **Havir Mfg. Co.**, Minneapolis. He was sales manager, Press-Rite Press Div., Sales Service Machine Tool Co., St. Paul.

Appointed general sales manager, **Denver Equipment Co.**, Denver, was **James E. Quinn.** He will direct national and international sales activities.

Promoted to assistant manager, Coke Plant Sales Dept., Engineering and Construction Div., **Koppers Co. Inc.**, was **C. K. Waibel.** He succeeds **O. H. Chambers,** retired.

Robert S. Kocourek was promoted to the new position of manager, manufacturing services, **Foote Bros. Gear & Machine Corp.**, Chicago. He was factory manager, Plant No. 1. He will co-ordinate manufacturing functions for all three Chicago area plants. Succeeding Mr. Kocourek was **Herbert V. Cork** who rejoins Foote Bros. For the last two years, he was planning manager, Solo Cup Co., Chicago.

Appointed plant manager, **United Welders Inc.**, Bay City, Mich., was **W. Blake Tripp.** He will direct engineering and manufacturing of welding and assembly machines.

John Allan Crosby was named automotive sales manager, **Rheem Automotive Co.**, division of Rheem Mfg. Co., Detroit. He was with Houdaille Industries, Detroit.

Wallace Macgregor was appointed president, **Climax Molybdenum Co.**, and vice president, **American Metal Climax Inc.**, the parent company, New York. He succeeds **Frank Coolbaugh.** A former treasurer of Climax Molybdenum and controller of American Metal Climax, Mr. Macgregor was vice president of Homestake Mining Co. Appointed general sales manager of Climax Molybdenum was **Elwin E. Smith.**

Dr. Harold W. Ruf was elected vice president, **Grede Foundries Inc.**, Milwaukee. He was director of the company's Research and Development Div.

Dr. Robert B. Mears was chosen assistant vice president-applied research, **United States Steel Corp.**,

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CEMENTED CARBIDE • DIVISION OF ALLEGHENY LUDLUM

ALBERT F. LOPEZ
Singer dept. chief

DONALD T. O'CONNOR
heads Magnaflux research

DR. W. WAI CHAO
advanced at Vickers Inc.

MICHAEL L. MANDEVILLE
U. S. Industries v. p.

Pittsburgh. He was director of the company's applied research laboratory at Monroeville, Pa. Succeeding Dr. Mears at Monroeville was **Dr. J. G. Donelson.**

Albert F. Lopez was selected to head the newly created Intelligence Systems Dept., **HRB-Singer Inc.,** unit of Singer Military Products Div., Singer Mfg. Co., New York. He was a section manager.

Donald T. O'Connor was chosen director-research and development, **Magnaflux Corp.,** Chicago. He was chief engineer, X-Ray Tube Div., Machlett Laboratories Inc.

Peter E. Leaf was promoted to manager-national accounts, **Nichols Wire & Aluminum Co.,** Davenport, Iowa.

Selected executive vice president, **Avco Corp.,** New York, was **James R. Kerr.** He will direct the company's newly formed defense and industrial products group.

Louis B. Schultz was appointed engine product manager for **Allis-Chalmers Mfg. Co.'s** engine-material handling division at Harvey, Ill. He was Chicago branch manager for engine sales.

Harold T. Ashworth was promoted to director-manufacturing, **Raytheon Co.,** Waltham, Mass. He was manager-manufacturing for the company's Missile Systems Div.

Leon Keizer and **Norman Polen** were named vice presidents of **Atlas Plating Co.,** Los Angeles, division of Associated Baked Enameling Co.

Dr. W. Wai Chao was appointed director-research and development, **Vickers Inc.,** Detroit, division of Sperry Rand Corp. He was chief of research.

Michael L. Mandeville was appointed president, International Div., **U. S. Industries Inc.,** New York. Mr. Mandeville, who was executive vice president of the division, succeeds **R. S. Wright,** named vice president-international trade of the parent company. Before joining U. S. Industries in 1959, Mr. Mandeville was associated with Continental Can Co., International Selling Corp., G. Tenant Sons & Co., and Signode Steel Strapping Co.

Youngstown Sheet & Tube Co., Youngstown, promoted three operating executives. They are: **James W. Kirkpatrick,** assistant to vice president - operations, a new post; **Robert H. Frushour,** general superintendent, steel plant and Struthers (Ohio) Works; and **Jack F. Major,** assistant general superintendent, succeeding Mr. Frushour. Mr. Frushour succeeds **Thomas A. Cleary Sr.,** retired. Mr. Kirkpatrick was assistant general superintendent, Brier Hill Works.

Elmer M. Richardson was made general sales manager, **Split Ballbearing Inc.,** Lebanon, N. H., division of Miniature Precision Bearings Inc. He will also direct sales for the recently acquired Carter Engineering Co., Ferrysburg, Mich.

W. E. Poulson was appointed superintendent-manufacturing for the Town of Tonawanda plant, **Linde Co.,** Buffalo. He succeeds **J. H. Brady,** transferred to consumer products division of the parent Union Carbide Corp. at Cleveland. Replacing Mr. Poulsen was **E. L. Baker,** now manager, production planning and material procurement.

Igor Kamlukin was named vice president-engineering, **Simplicity Mfg. Co.,** Port Washington, Wis.

OBITUARIES...

Charles G. Allen, 84, general manager-treasurer, **Charles G. Allen Co.,** Barre, Mass., died July 17.

John E. Fletcher, 62, superintendent, Sheridan (Pa.) blast furnace, **E. J. Lavino & Co.,** Philadelphia, died July 26.

William Mark Currie, 78, co-owner and chairman, **Currie Products Ltd.,** Hamilton, Ont., died July 26.

Henry F. Wardwell, 83, founder and president, **Burnside Steel Foundry,** Chicago, died Aug. 1.

William F. Goetz, 61, chief production engineer, **Beardsley & Piper Div.,** Pettibone Mulliken Corp., Chicago, died Aug. 1.

George W. Brandt Jr., 44, owner, **Brandtool Co.,** West Milton, Ohio, died July 29.

J. Merle Hosdowich, 65, chromium plating engineer and researcher, **Metal & Thermit Corp.,** Tucson, Ariz., died July 15.

Control and Inhibit Acid Cleaning or Pickling with ACTIVOL

REG. U.S. PAT. OFF.

CLEAN METAL
BETTER
at Lower Cost
•
KILL FUMES
•
REDUCE PITTING
•
RINSE COMPLETELY

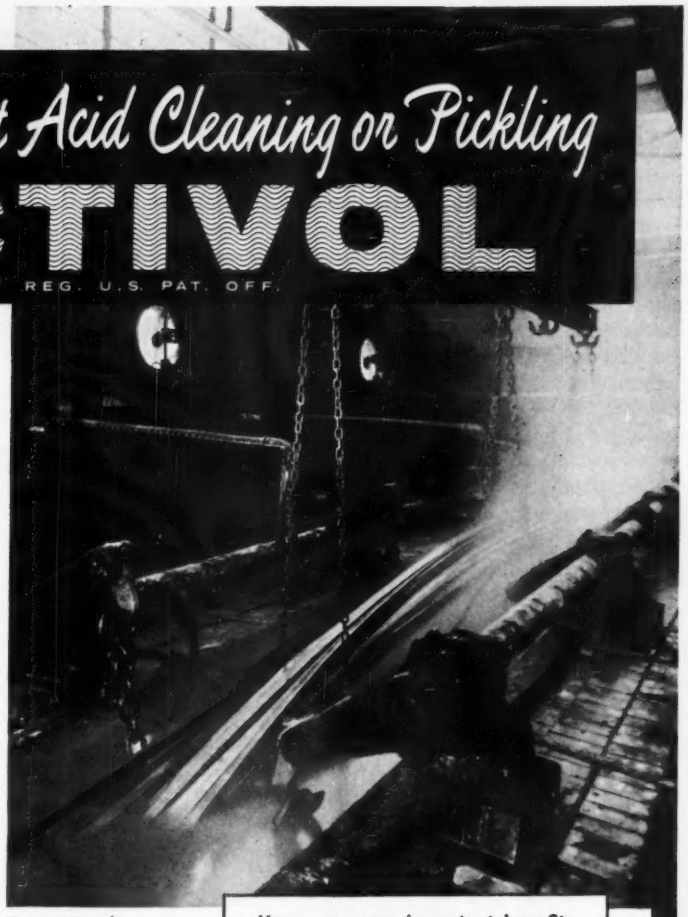

Photo courtesy of
PRECISION DRAWN STEEL CO.

Activol is a series of original chemicals that control and regulate the action of acid on metals for quicker or more effective removal of scale, rust, grease and salt deposits in acid baths. Cleaning and descaling can be accelerated or controlled while inhibiting the action of the acid on the base metal. Metals come out cleaner and brighter and at the same time the "bite" of acid fumes is reduced to a minimum.

There is an Activol powder or liquid for every purpose in pickling, acid cleaning, removing calcium or magnesium salts, preparing metal for painting and other acid cleaning operations.

Here are some important benefits ACTIVOL gives you:

1. **Controls or accelerates acid action while inhibiting the effect on base metal**
2. **Removes scale and rust, cleans off oil, grease and salt deposits without pitting or etching**
3. **Non-colloidal ACTIVOL reduces hydrogen embrittlement**
4. **Acid often lasts as much as 50% longer, requires less frequent replacement**
5. **ACTIVOL reduces fumes and odors**
6. **ACTIVOL is not a coal tar derivative—is completely soluble in all acid solutions**
7. **Compatible with any organic or inorganic acid**
8. **Costs less to use than other inhibitors**

Write, wire or phone for help on specific problems or further information on ACTIVOL additives.

HARRY MILLER CORP. HAMICO 4th & BRISTOL STREETS PHILADELPHIA 40, PA.

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Bethlehem Steel Expands Industrial Fastener Plant

PACIFIC COAST DIV., Bethlehem Steel Co., is expanding its industrial fastener plant in Seattle. The facility will be in a better position to serve the Northwest with cold formed bolt products ranging up to 1 in. in diameter and up to 6 in. in length, says W. J. Bolton, general manager of the plant.

New equipment to be housed in a structure adjoining the main building includes a ¾ in. cold boltmaker for the production of ⅝ in., ¾ in., and ⅞ in. bolts and ⅞ in. and 1 in. diameter rivets up to 6 in. long as standard products. Also planned is a new Universal cold header for ½ in. and ⅝ in. diameter bolts and ½ in., ⅝ in., and ¾ in. rivets—all up to 6 in. long.

All present cold working equipment, including cold heading cold nut machines, automatic pointers, trimmers, roll threaders, and automatic tapping machines, will be relocated in the new building.

New facilities and improvements will also enable the plant to produce a great variety of fastener specials.

The project will include installation of equipment for washing and applying rust protection for cap screws and stress relieving facilities. The equipment can be used for drawing or tempering heat treated bolts as well as for the annealing of rivets.

All equipment and facilities in the new and old portions of the plant will be laid out and positioned for maximum efficiency in handling and production, Mr. Bolton adds.

The division's new office building in San Francisco will be used for structural dynamic and seismological research. Extensive instrumentation will record the building's response to earthquakes and windstorms.

Wean Forms British Firm

Wean Engineering Co., Warren, Ohio, in association with John Miles & Partners Ltd., is organizing Wean-Miles Ltd. to manufacture and sell sheet, strip, and tin mill equipment of Wean design in Great Britain. Officers of Wean-Miles, 76 Cannon St., London, EC 4, England, are: Co-chairmen, R. J. Wean and John Miles; alternate co-chairman, R. J. Wean Jr.; managing director, D. A. McArthur; secretary, J. R. Thring; deputy managing director, A. R. Geiszler.

Republic Improves Mills

Contract for new soaking pits at the Buffalo Works of Republic Steel Corp. has been awarded to Amsler Morton Co., a division of Textron Inc., New York. The replacements for obsolete soaking pits will include one row of five hole soaking pits of the one way fired type, equipped with all metallic recuperators for heat exchange rather than the tile and metallic style of recuperators formerly used.

Pipe Firm Boosts Capacity

Lock Joint Pipe Co., Perryman, Md., manufacturer of concrete pressure pipes, has installed additional electronically controlled processing equipment. John Tapley is plant manager.

Buys Wire Rod Mill

Narragansett Wire Co., Pawtucket, R. I., has ordered a semi-continuous Loewy wire rod mill from the Industrial Equipment Div., Baldwin - Lima - Hamilton Corp., Philadelphia. The installation will consist of one, three high, roughing mill; two, two high, intermediate mills; four, two high, continuous, finishing mills; and auxiliary equipment.

Kaiser Builds Gary Plant

Kaiser Aluminum & Chemical Corp., Oakland, Calif., is constructing a plant in Gary, Ind., for the primary purpose of calcining petroleum coke. The product is used in the manufacture of carbon electrodes for the reduction cells in the company's primary aluminum plants. Construction will include installation of a 180 ft, rotary kiln and related handling facilities. Annual calcining capacity: About 120,000 tons of coke. Investment: About $1 million.

Ford Orders Oxygen Plant

An oxygen plant, designed to simultaneously produce gaseous and liquid oxygen at low pressures, will be built by Dravo Corp., Pittsburgh, for Ford Motor Co.'s Steel Div., Dearborn, Mich. It will have a daily production capacity of 280 tons of gaseous oxygen, 10 tons of liquid oxygen, and 1.4 tons of liquid nitrogen (all 99.5 per cent pure). The plant will be owned and operated by Ford and is scheduled to go on stream in December, 1961.

The oxygen generating system will employ the Linde-Fraenkl process, a development of Linde AG, Munich, Germany. Dravo recently acquired distribution rights for the process and equipment from Linde AG.

Beacon Steel Expands

Beacon Steel Products Co., Westminster, Md., has completed a 14,000 sq ft plant addition, increasing total area to 38,000 sq ft. A. P. Scott is president. The firm makes poultry and farm equipment.

Standard Tube Retools

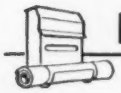
Size ranges of square, rectangular, and round welded steel tubing have been increased with the installation of new tooling at Standard Tube Co., Detroit. The new equipment is part of the firm's 1960 over-all expansion program.

Boosts Extruding Capacity

New extrusion plant facilities of Fetter Bros. Aluminum Mfg. Co. at Jeffersonville, Ind., are in full operation, giving the company 215,000 sq ft of manufacturing space. Major items of equipment are a 1650 ton, Sutton extrusion press and related production, handling, and tooling equipment. Shapes in a cross section up to 10 in. in diameter can be extruded on the press. The company plans to triple its present anodizing capacity this year at its Spring Street plant in the same city.

Plans Diecasting Plant

A diecasting plant is being erected in Edison, N. J., for Aluminum Co. of America, Pittsburgh. The building will contain 220,000 sq ft of industrial space and 20,000 sq ft for offices. Elizabeth Iron Works Inc., Union, N. J., fabricated 1471 tons of steel for the structure.



NEW ADDRESSES

Datamatic Div., Minneapolis-Honeywell Regulator Co., moved its Boston branch sales office to 624 Worchester Rd., Framingham, Mass.; its Detroit office, to the Fisher Building.

Cometals Inc. transferred its offices to 61 Broadway, New York, N. Y. N. J. Muskin is vice president of the firm which is a subsidiary of Commercial Metals Co., Dallas, dealer in ferrous and nonferrous scrap.

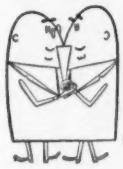
F. J. Stokes Corp., Philadelphia, moved a branch sales office to 5875 N. Lincoln Ave., Chicago 45, Ill.

Production facilities of the **International Process Equipment Co.** have been moved to East Liverpool, Ohio, where it has become a division of Patterson Foundry & Machine Co.

ASSOCIATIONS

Smith Bolton was elected president of the **Powder Metallurgy Parts Manufacturers Association**, a federated trade association of the Metal Powder Industries Federation, New York. Mr. Bolton is president and general manager of U. S. Graphite Co., a division of Wickes Corp., Saginaw, Mich., maker of powder metallurgy parts including self-lubricating bearings.

Roy E. Blue, Chrysler Corp., Detroit, was elected president of the **American Powder Metallurgy Institute**, the technical arm of the Metal Powder Industries Federation, New York. Local sections of the new organization have been organized in Chicago, Philadelphia, Detroit, and Western Pennsylvania. New chapters are planned in Los Angeles, Indianapolis, Cleveland, New York, the Southern tier of New York State, and Dayton, Ohio.



CONSOLIDATIONS

Dura Corp., Oak Park, Mich., purchased **Page & Page Co.**, Portland, Oreg., manufacturer of transportation equipment. The property will be operated as a division with Ancel S. Page general manager.

Atlas Mineral Products Co., Mertztown, Pa., and **Chemical Linings Inc.**, Watertown, N. Y., have merged. Chemical Linings will move to Mertztown where it will be operated as an Atlas division. Both firms are wholly owned subsidiaries of Electric Storage Battery Co., Philadelphia. M. H. Bennett continues as president of Chemical Linings Div.

Textron Electronics Inc., New York, acquired **Spectrolab Inc.**, North Hollywood, Calif., which is engaged in research and manufacturing in the electro-optical field.

Hupp Corp., Cleveland, acquired **E. Roy Industries Ltd.**, Montreal, Que., and will operate the firm as a subsidiary. The Canadian firm makes household refrigerators, gas and oil warm air furnaces, and gas and electric ranges. It also makes aircraft parts and assemblies.

Turnkey Engineering Co. Inc., South Gate, Calif., has become a wholly owned subsidiary of Electric Furnace Co., Salem, Ohio. Turnkey builds metal cleaning equipment, spray booths, ovens, plating equipment, heat treating furnaces, air purification systems, and material handling and conveying systems.

Hiller Aircraft Corp., Palo Alto, Calif., and **Electric Autolite Co.**, Toledo, Ohio, are negotiating a merger.

Pheoll Mfg. Inc., Chicago, acquired **Progressive Mfg. Co.**, Torrington, Conn., a division of Torrington Co. The firms make fasteners. Progressive will operate as a division of Pheoll of New England Inc. under the direction of S. C. Adamek, general manager of all Pheoll operations.

Magnetics Inc., Butler, Pa., will acquire **Kemco Corp.**, Sandy Lake, Pa., subject to approval of stockholders. Kemco is an industrial control panel manufacturer and will be operated as a subsidiary under L. N. Martin, president. Magnetics Inc. is constructing a $400,000 building at East Butler, Pa., to house the firm's expanded research and development facilities and the firm's officers, directors, and financial department.

NEW PLANTS

Sparton Corp., Jackson, Mich., dedicated its 62,000 sq ft plant at Flora, Ill. The facility will be devoted to the production of commercial electronic products, stamped metal parts, automotive accessories, and a newly developed automobile horn. It will be operated by a subsidiary, Sparton Mfg. Co., under the direction of M. E. Rice, vice president and general manager.

Linde Co., a division of Union Carbide Corp., New York, dedicated its Ribbonrail welding plant at Harrisburg, Pa. The plant is the first of several planned to produce continuous welded rail on a contract basis.

National Can Corp., Chicago, will operate a 200,000 sq ft can manufacturing plant being built in Edison Township, near Metuchen, N. J. The plant will have a daily capacity of more than 2 million cans. Production is expected to start early in 1961.

Ultrasonic Industries Inc., manufacturer of ultrasonic cleaning machines, is erecting an 18,000 sq ft plant at Plainview, N. Y. Occupancy is expected early this fall.

Nesor Alloy Products Co. opened a new plant and adjoining sales and administrative facilities at 666 Passaic Ave., West Caldwell, N. J. The company produces fine drawn wire in all ferrous, nonferrous, and precious metals.

Missile's "Fast Draw" Starts

Cold-drawn Seamless Cuts Clean-up Costs For Anker-Holth's Power Cylinders

The Missile Age version of the "fast draw" starts with the lightning stroke of a power cylinder.

Big, 12-foot stroke hydraulic cylinders provide the power and speed that unsheath one of the nation's principal defense missiles for instantaneous action.

They're made by Anker-Holth Division of The Wellman Engineering Company from Pittsburgh Steel Company's commercial quality, carbon steel, Seamless Mechanical Tubing.

Mounted two to a unit, the husky cylinders must—within seconds, and without fail—slide back the two halves of the hangar-size missile shelter to release the weapon for firing.

Anker-Holth, of Port Huron, Mich., uses Pittsburgh Steel's Seamless Mechanical Tubing to manufacture this critical unit's outer cylinder and piston rod.

Relies on Pittsburgh—What makes this company rely on Pittsburgh Steel for the tubing it requires for this application?

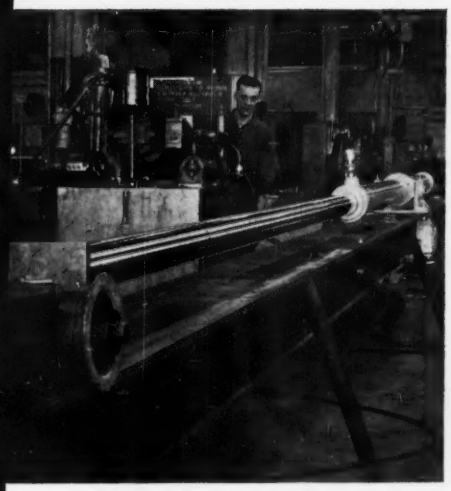
Fred J. Theisen, vice president-production, says there are several reasons. He explains:

"First is Pittsburgh Steel's service. They're able to give us information fast.

"On the first lot of tubing for this job, we asked all our suppliers for recommended sizes for cleanup to our finished dimensions. Pittsburgh

Piston rod made by Anker-Holth for launcher shelter's roof activating cylinder requires only minimum processing for cleanup with commercial quality Pittsburgh Steel Seamless Mechanical Tubing. Finished rods, 142" long, are plated with hard chrome. Vice president-Production Fred J. Theisen, (left) talking with Pittsburgh Steel salesman T. J. Whan, says Anker-Holth relies on Pittsburgh Steel tubing for this missile component.

With Pittsburgh Steel's Tubing



Final hydraulic testing on completed cylinders is comprised of 30 cycles at 4,500 psi—using special Anker-Holth testing equipment.

Fast service, straightness, and minimum stock removal convinced Anker-Holth that "Pittsburgh was best we could get for this job." Cylinder measures 5 inches by 4 inches by 143 inches. Anker-Holth specializes in power cylinders with bores from one to 48 inches, and strokes to 45 feet.

Steel's answer was in first, and it suggested less stock removal.

"That's important, and it's one reason Pittsburgh Steel stays with us. We ask them for size recommendations that we need for cleanup. They tell us the size, and they do it in a hurry. They don't wait around for a couple of months to reply.

"For another thing, when we first started production of this cylinder, we had a problem of straightness.

"I don't know how they did it, but Pittsburgh Steel came through with a batch of tubing I had never seen the equal of. Pittsburgh makes a quality tube. Straightness is the big thing—plus service and the amount of stock we must remove. With Pittsburgh Steel Seamless Tubes we don't need extra metal for honing—so we aren't paying for metal we don't use."

Experience Pays—Close attention to customers' needs and experience, plus steelmaking skills and production practices developed in nearly 50 years of seamless tube production, make Pittsburgh Steel able to serve Anker-Holth this way.

In this instance, Pittsburgh Steel's ability to produce commercial quality cold-drawn seamless mechanical tubing to exacting standards for straightness, concentricity and tolerances, allows Anker-Holth to simplify its cleanup process of the cylinder's ID and centerless grinding of the piston rod's OD.

Machinability and weldability of Pittsburgh Steel's tubing are vital factors in Anker-Holth's production, too, because plugs, ports, sleeves, piston and end covers are threaded and/or welded to the piston rod and cylinder in this application.

Contact one of the distributors or district sales offices listed below. Then let Pittsburgh Steel Company demonstrate its ability and readiness to help. You, too, will find that Pittsburgh Steel's tubing is the best you can get.

Pittsburgh Seamless Distributors

Baker Steel & Tube Company
Los Angeles, California

Chicago Tube & Iron Company
Chicago, Illinois

Cleveland Tool & Supply Co.
Cleveland, Ohio

Drummond, McCall & Co., Ltd.
Montreal, Quebec, Canada

Edgcomb Steel Company
Philadelphia, Pennsylvania

Gilmore Steel & Supply Co.
San Francisco, California

Earle M. Jorgensen Co.

Perry Kilsby, Inc.
Los Angeles, California

Mapes & Sprowl Steel Co.
Union, New Jersey

Metal Goods Corporation
St. Louis, Missouri

Miller Steel Company, Inc.
Hillside, New Jersey

A. B. Murray Co., Inc.
Elizabeth, New Jersey

C. A. Russell, Inc.
Houston, Texas

Ryerson, Joseph T. & Son, Inc.
Chicago, Illinois

Solar Steel Corporation
Cleveland, Ohio

Standard Tube Sales Corp.
Brooklyn, New York

Steel Sales Corporation
Chicago, Illinois

Tubular Sales
Detroit, Michigan

Ward Steel Co.
Boston, Massachusetts

Ward Steel Service Company
Dayton, Ohio

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

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Steel

"THIS GEAR WILL GIVE MY DRIVE HIGHER SPEED PLUS LONGER LIFE..."

Utilizing the modern facilities in our newly equipped plant, higher speed and longer life are just two of the advantages that you will get with Philadelphia's revolutionary precision grinding technique. Very often these advantages are available at no more initial cost than conventional gearing.

HIGHER SPEEDS

Dynamic load factors are materially reduced. Your equipment can operate at higher speeds with increased load carrying capacity.

LONGER LIFE

Extreme accuracy of profiles, profile spacing and surface finish eliminates "running-in" periods and resulting wear.

REDUCED NOISE AND VIBRATION

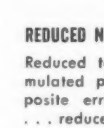
Reduced tooth to tooth errors, accumulated pitch errors, and total composite errors give smoother contact . . . reduce noise and vibration.

REDUCED BACKLASH

Precision ground gearing means reduced backlash for reversing drives . . . plus uniform backlash where precision of movement is important.

100% INTERCHANGEABILITY

Duplicate units or spares can be installed with original manufacturing tolerances duplicated exactly.



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King of Prussia (Suburban Philadelphia), Pennsylvania

CONTINUOUS ANALYSIS— An x-ray device developed at Milwaukee by General Electric Co. analyzes up to five elements, liquid or solid, as the material flows past a check point. It can also control the degree and quality of mixes, the firm claims.

FILM MEASURES HEAT— Surface temperature measurements, possibly more accurate than present methods, can be made by measuring the resistance of a superimposed thin metal film, says Rensselaer Polytechnic Institute, Troy, N. Y. Most promising so far: Nickel which outperforms platinum.

AUTOMATIC ATOMIC BRICKLAYER—Advanced electronic transistors and tunnel diodes are being "grown" at IBM, New York, by a vapor technique that is said to be a major advance in solid-state technology. Significance: Faster, more complex, more compact components for tomorrow's computers. It could eliminate manual assembly of such devices and some of the assemblies that contain them, say technologists.

CUTS REFRACTORY COSTS—A new refractory, Crystolon 63, is expected to sell for less than comparable nitride bonded, silicon carbide refractories when it becomes commercially available. The maker, Norton Co., Worcester, Mass., lists these applications: Linings for aluminum reduction cells and reverberatory furnaces; nonferrous metal transfer systems; incinerators; kiln furniture.

LEND-LEASE INSPECTION— You can borrow a betatron from Allis-Chalmers Mfg. Co., Milwaukee. Example: A 25 million volt job at Massillon, Ohio. By day, it's a therapy unit for radiologists; by night, an industrial nondestructive test unit.

HYDROGEN SLEUTH— A new method makes it possible for operators of plating, pickling, or various aqueous baths to check the tendency of parts to pick up hydrogen (it makes them brittle) during each step of processing. Key: An ordinary steel-jacketed radio tube which is used as the anode of an electronic system. When immersed in a bath, the amount of hydrogen which diffuses through the shell into the tube is measured electrically. STEEL hears that at least one aircraft firm is seriously considering commercial production.

LIGHTEN BUILDINGS— A new kind of structural steel (A36) will cut the weight of structures 4 to 6 per cent, claims U. S. Steel Corp., Pittsburgh. It adds: Minimum yield is 33,000 psi, about 10 per cent better than older types. Cost is 1/20th cent higher.

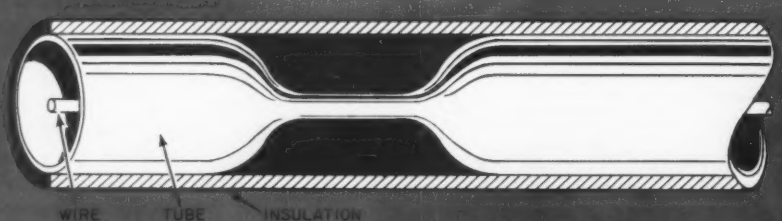
HIGHLIGHTS METAL NEEDS— Titanium, stainless steels, vacuum melted alloys, aircraft aluminum—those are a few of the metals which are getting increased attention for tomorrow's Navy craft, says Vice Adm. George C. Beardsley, chief of Naval materiel. Full size, hydrofoil warships which can travel 100 mph will quite likely be made like an airplane to lighten hull construction. The hydrofoil itself will require exceedingly high performance metals.

FEWER LAB DUELS— Variations of test results from two or more laboratories can be evaluated mathematically to determine which one is in error, states the National Bureau of Standards, Washington. The bureau's J. Mandel and T. W. Lashof developed a model for statistical analysis which enables an investigator to distinguish between random (expected) and systematic ("*your* fault") errors.

JULES VERNE MINES—The ocean floor contains fabulous, untapped quantities of manganese, cobalt, nickel, copper, and various phosphate ores, says John L. Mero, University of California. A specialist in the field of underwater mining, he told a Southwestern metals conference that nodules dredged from many parts of the world contain from 20 to 45 per cent manganese. Mining cost would run between $3 and $5 a ton, he believes.

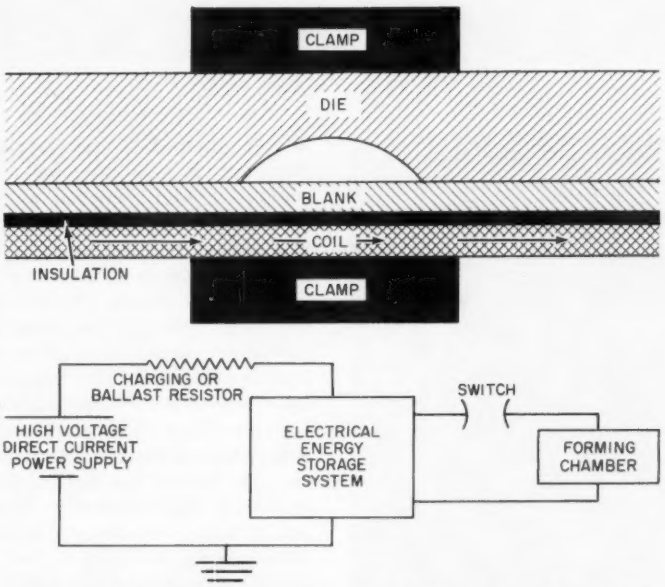
Magic of Magnetism Forms, Coins, Machines, Heat Treats Metals

Passing a huge quantity of electricity through a coil produces the concentrated magnetism needed to do work. Here is a preliminary report of progress being made by research people at several aircraft and private firms. They say the technique looks promising



Necked-down section of this coaxial cable is a dramatic example of magnetic forming. Cable placed in the center of a coil is deformed by the intense, sharp power of magnetism generated by high voltage discharge through coil. Nonconducting insulation hasn't been touched

Here Are Basic Forming Tools



Simple schematic drawing explains principles of electromagnetic forming equipment. Storage section contains large capacitors. Forming chamber (right) is detailed in the drawing at top. Discharge forces metal into die cavity

HERE'S another high energy rate forming technique that bears watching. It's called electromagnetic forming (surges of magnetism that exceed 50,000 psi in power are used), but the name is misleading because the method extends to coining, machining, heat treating, and possibly cutting or gouging. Eventually, some operations may be combined.

At least three private research firms and four aircraft companies are doing development work. Convair Div. (San Diego, Calif.) of General Dynamics Corp. calls its version Magnapak.

STEEL saw the results of a coining operation. Details in dimes, quarters, and half dollars were faithfully reproduced in several aircraft sheet metals.

Research and engineering people predict that the technique will handle most metals quickly and cheaply.

• Principles of operation and the equipment are fairly simple, but application techniques require ingenuity and careful design.

All you need are an adequate source of direct current, banks of condensers, switching gear, proper dies and fixtures (see illustration above), and a coil to concentrate the magnetic force. Occasionally, the metal and dies are used as conductors instead of a coil.

When all the elements are in place, a switch quickly dumps a high voltage charge of electricity through the coil. The magnetic field builds so rapidly it forces the adjacent metal into the die with near explosive velocity. The results in some respects are similar to those obtained with high velocity forming. One difference: The machine can be used indoors.

Magnetism moves metal in much the same way a rapidly expanding gas does. It must be applied suddenly—you can't keep the magnetism on because it permeates the metal. After a part is loaded and clamped, the operation takes about 1/1000th second—the time needed to discharge the condensers in the power supply.

• Heat treatment rates top interest at M.H.D. Research Corp., Newport Beach, Calif.

The company says that control is comparatively accurate. The magnetism induces heat in the metal, and it can be regulated to harden the surface only. Energy efficiency is said to be higher than that of forming. Action resembles high frequency induction heating except that the power is thousands of times greater.

• The amount of magnetism needed in forming and heat treatment depends on the electrical characteristics of the metal. Careful measurement of the physical dimensions of workpieces is also required.

Conductivity determines power needs, says Dr. Vernon Blackman of M.H.D. Corp. Copper requires 300,000 gauss before it yields in forming. Tungsten needs more than 1 million, as do large shapes.

Main problems yet to be solved: Coil construction and power sources. Under such strong electrical impulses, coils tend to fly apart, so massive construction is needed. Most people find forces up to 500,000 gauss reasonable to achieve, but 1 million would require several rooms full of condensers. Switching such amounts would also be a problem.

• The method is an outgrowth of space research. Dr. Blackman pinpoints a few real potentials.

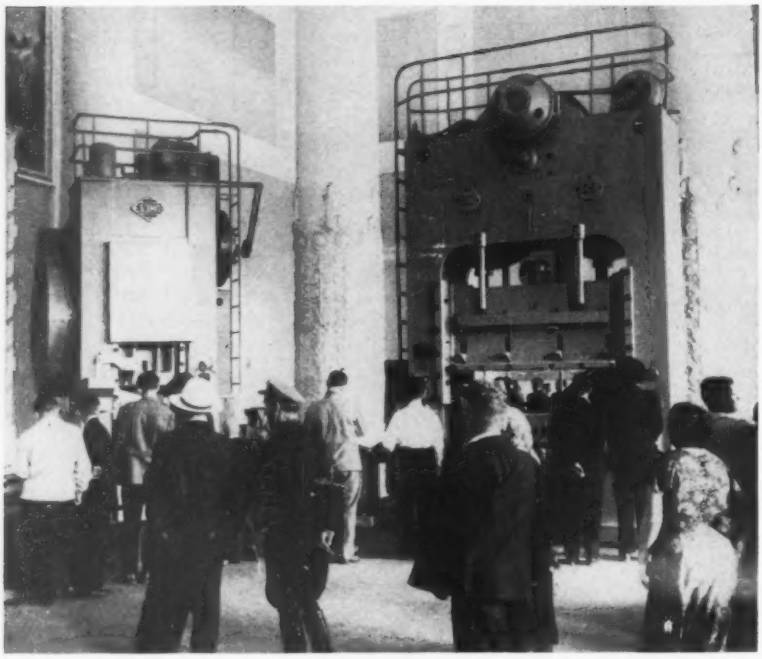
"We were working on space ship propulsion. When we got tired of having coils explode, we simply asked ourselves: 'Why not ignore the space angle for a while and see what this will do with metals?' "

Dr. Blackman says the major benefits will probably be realized in those areas of forming which require dies (some forming can be done without them).

The goal: To build a machine that an ordinary workman can operate by pushing a button.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.

Soviets Push Machine Tool Industry



Visitors at Moscow's Machine Tool Pavilion watch demonstration of a small, high speed forging press (left) and a double crank knuckle press (right)

Also shown at the Machine Tool Pavilion: This precision jig and die sinker. The control console at right is for programing the complete machine cycle

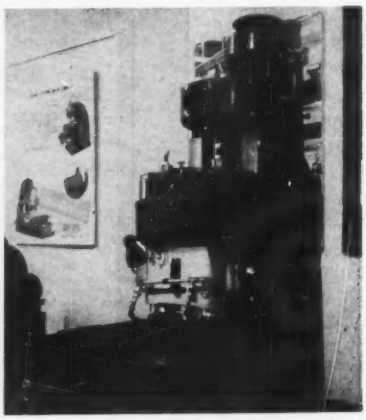
MORE than 2000 new types of machines, mechanisms, and other equipment were designed and developed in the Soviet Union last year, says the Central Statistical Administration in Moscow.

The same source declares that 400 new types of machines and equipment were put into production and more than 600 obsolete designs were taken out of production.

Comparisons with earlier production data and observation of Soviet machine tools at the Agricultural & Industrial Exhibition in Moscow and in some production plants confirm that the USSR is making impressive progress in this field.

• Last year the figure was 146,000. This year, they plan a 12 per cent boost.

Late last year, A. N. Kosygin, chairman of the USSR State Planning Committee, took a long look at 1960. He declared that output of machine building and metalworking industries would be increased 12 per cent this year. "The highest rates of increase are planned for the production of machinery and



Russia's version of a two spindle, rotary milling machine. The author reports that construction details are similar to those of some U. S. builders

Although their technology lags ours, the Russians expect to be in contention for tomorrow's world markets. Government is clamoring for more machines, higher quality

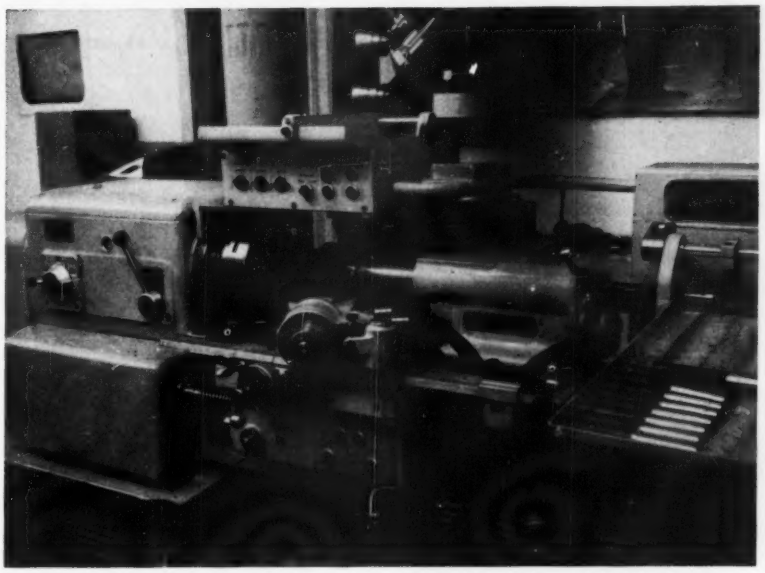
By RICHARD E. STOCKWELL
Avco Corp.
Cincinnati

equipment for leading branches of heavy industry—metallurgy, chemistry, oil and gas industries, and powerplants," he added.

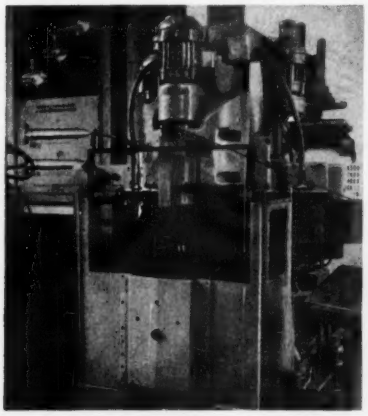
Mr. Kosygin predicted about "400 major types of new equipment for metalworking would be put into series production in 1960 and more than 1400 experimental models of new machines, mechanisms, and devices would be developed and manufactured." Finally, he estimated that 65,000 new metalcutting machine tools and 7000 new presses will be installed in Russian factories this year.

Most of the new metalworking machines produced in Russia this year will be small, electric powered, and manually operated. They include lathes, drilling machines, and grinders. Some complex, elaborate machines will be built and given wide publicity, but I believe that their numbers will be small.

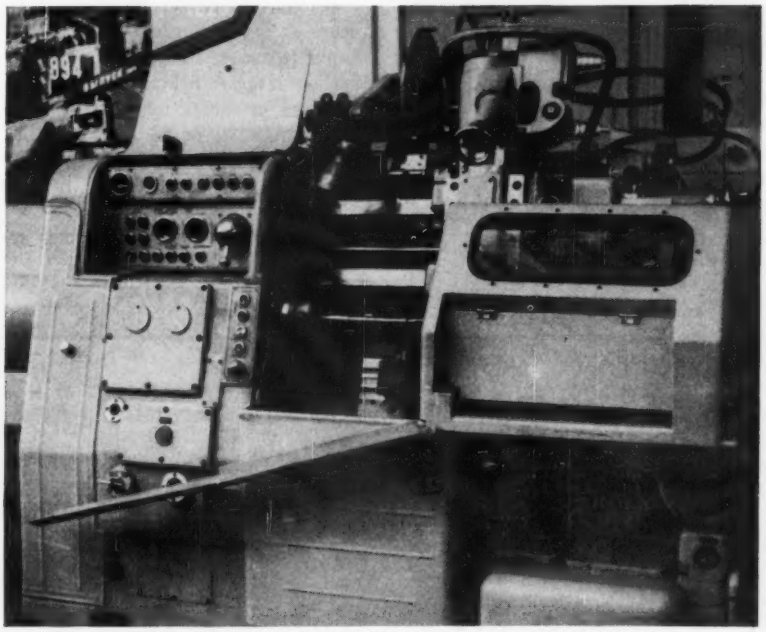
• Only a few of the new machines will be operated by electronic control devices. Most machines to which the Russians point with pride as "automated" are really electro-



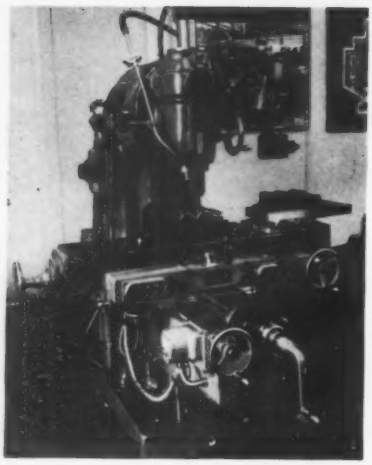
Shafts (shown in the tray at right) are loaded and unloaded automatically on this hydraulic tracer lathe



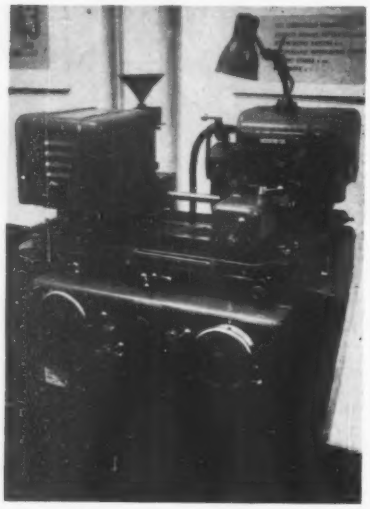
This is a Russian built rotary gear shaper. The operator's control pedestal is at right. The machine cycle can be programed



Automatic and manual controls are combined in this hydraulic, single spindle tracer lathe with programing equipment. It was probably copied from a West German builder's design



This plain vertical milling machine is equipped with a swivel head and a copying attachment. It has been identified as a Soviet copy of a West German builder's design



The author says that this cylindrical grinder is similar to any one of a variety of makes found west of the Iron Curtain

mechanical types that have been available in the West since World War II.

I know of no electronic, self-correcting feedback devices in production in the USSR. At best, the Soviets remain one step behind in imitating U. S. and West machine tool designs.

One can gain an impression of the state of the art of Soviet machine tools at the Machine Tool Pavilion at the Agricultural & Industrial Exhibition. Machines are under power, so their operations can be demonstrated.

From the way machines are shown to visitors, it is evident that the Soviets are anxious to develop an export market (especially among the satellites).

New models are frequently introduced at the Pavilion. For example, in 1958 a model of a large extrusion press for aircraft skin sections and some cutting type machines were shown. The metal cutting machines were programed by a computer.

Some of Russia's plants are as up to date as the Communists claim. But others are cramped and old fashioned.

One plant in Stalingrad I visited (it was associated with the large tractor works) was old and had been expanded piecemeal. Workers made small wrenches, various sizes of springs, grease guns, and other items.

The largest springs produced, to be used on a tractor chassis, were made from $\frac{3}{8}$ or $\frac{1}{2}$ in. stock that was heated in a gas furnace. Two men coil the stock with the aid of a power spindle.

A small tool design shop was attached to the plant. In it were perhaps 80 small universal type machine tools, each with its own operator. Several machine tools had U. S. and German labels. All were prewar models.

Though the plant had little automation, I was told it soon would be adding some fully automated lines. Spring coiling, for example, was to become automated. Springs would be automatically heat treated, ground on the ends, and tested after they were coiled.

• Real growth in productivity is still to come.

F. R. Kozlov, a first vice chairman of the USSR Council of Ministers, said in February: "More than half of the growth in labor productivity Russia has planned for the seven year period (1959 to 1965) is to be effected through the introduction of new machinery and equipment. In practical terms, this means that all branches of the national economy will be re-equipped in the seven year period."

He listed the first job of the machine building industry in the USSR as: "The creation of machinery and equipment with which to complete the automation of arduous and labor consuming jobs and the creation of more productive and economical machines — automated equipment in particular."

Goals call for the production of 190,000 to 200,000 machine tools in 1965, and some 38,000 "aggregate" (multiple operation) machine tools in the same year. In addition, some 36,200 presses are to be produced, and some 280,000 to 300,000 automatic lines (endless belt or chain or similar transfer type

Richard E. Stockwell has twice toured Russia, visiting Moscow, Leningrad, Kiev, Sochi, Tiflis, Rostov, and Stalingrad. He has been the editor of a U. S. aviation publication and has authored a book, *Soviet Air Power*. Mr. Stockwell continues his research of Russian affairs (another book is being planned), and he is now director of public relations and advertising for Avco's Crosley and Nashville Divisions.

operations) are to be established.

To implement its program, the USSR relies on design staffs at its machine tool building plants, such as the huge Kirov plant, or the Ordzhonikidze Urals Heavy Machine Building Plant.

In addition to the plants themselves, the Russians have the Experimental Scientific Research Institute for Metal Cutting Machine Tools in Moscow. (It's better known as ENIMS.) It does research and development on machine tools and controls the design of all machine tools produced in the USSR. Even factory derived designs must be approved by ENIMS before they are put into production.

But a change is underway in machine tool production. V. Krotov, director of the Urals Heavy Machine Building Plant recently pointed out in *Pravda*: "The majority of machine building plants (in the USSR) now produce a large variety of machines in small numbers. This great shortcoming is especially true at the Urals plant, where the variety of output has expanded incredibly. This holds back the specialization of shops and sections and impedes the introduction of automation."

Mr. Krotov is obviously calling some problems to the attention of the State Planning Commission. He wants to limit responsibility for each product to two or three plants, so that each plant can achieve a greater degree of specialization. With that kind of machine tool production, there seems to be little doubt that Russia would become a formidable competitor in the world's machine tool markets.

Warehouse Installs Lab

A new quality control laboratory in a steel warehouse greatly reduces delivery time for customers who order stock with exceptionally close tolerances on specific properties.

The warehouse, Rolled Steel Corp., Skokie, Ill., expects that its lab will be the forerunner of many similar installations.

Equipment in the new lab includes a Rockwell tester for hardness, Olson cup tester for drawing properties, a portable nibbler for sampling, bend tester, and direct reading micrometers.

Maintenance man puts packing in a steam hammer stuffing box. This type combines advantages of jam packing rings with automatic sealing of V-ring design. The packings are outlasting prior types by 3:1

Packings Cut Hammer Care

A SWITCH from conventional steam hammer packings to a grade developed for oil mud pumps cut "packing replacement costs for our 43 steam hammers by a third and reduced the number of times maintenance men have to service our hammers," says Robert Klossner, maintenance superintendent, Transue-Williams Steel Forging Co., Alliance, Ohio.

The savings are attributed to: 1. Using one packing instead of the three previously required. 2. Reduction (by one-third) of the time it took packing crews to service the hammers.

• **Saves Hammer Rods** — Previous packings were compressible; the packing gland had to be adjusted constantly. Constant tightening of the glands squeezed lubricant from the packing and created uneven wear, which caused dry spots on the packing surface. The dry spots led to rod scoring. Also, conventional packing shifted, contributing to uneven wear on hammer rods.

The new packing, Vee Square No. 33 (Raybestos - Manhattan Corp., Passaic, N. J.), has been self-sealing and self-adjusting in the hammers. It seals radially against the stuffing box wall when the pressure stroke occurs.

Two trial sets installed by the Cleveland distributor, Alan Packing Co., outlasted former packings by 3:1. Since then, average life has been three weeks; before, it was one week. Extended life has also trimmed inventory requirements.

Another advantage: Formerly, pools of sprayed water collected around the hammers, creating an annoyance to operators. Now the problem is alleviated.

Symposium Gives Tape Control Big Boost

NUMERICAL CONTROL has become essential to metalworking.

That's the opinion of Francis J. Trecker, president, Kearney & Trecker Corp., Milwaukee. It's shared by a panel of metalworking experts that participated in a week-long K&T symposium to acquaint users and prospective users with the techniques and potentials of the fast growing control concept.

"It's a tool we can use to fight inflation and increasing wage costs, and it can help us keep up with new materials and designs," Mr. Trecker believes.

• "Numerical control is the only method we have to keep us competitive."

That's the opinion of W. D. Geist, director of sales, Boeing Applied Computer Service, Boeing Airplane Co., Wichita, Kans. He says: "We put numerically controlled machines on the production floor and make them work. Every machine has been made to produce two to eleven times more than our former methods. We are going to replace conventional machines with numerically controlled equipment anytime we get a pocketful of change."

J. J. Childs, chairman of the numerical control program at Republic Aviation Corp., Farmingdale, N. Y., says his rule is that a part must bring at least a 75 per cent saving in production time or it stays on conventional machines. Still, his machines find plenty of qualified jobs. "On one part we were able to save 93 per cent in machining time over conventional methods."

• "The technique has paid off in machining aluminum and may be even more profitable in machining superalloys."

So says Arthur J. Burke, chief methods engineer, McDonnell Aircraft Corp., St. Louis. So far, the firm has done only the simple straight-line and circle jobs. With the acquisition of a K&T four axis profiler, the engineers will begin to program the equation-defined curves.

Mr. Burke believes machine tool builders will have to design special machines for cutting the new superalloys and provide them with numerical control. Stressing the difference between aluminum and superalloys, he tells of a pocket milling job where he was able to remove 32 cu in. of aluminum a minute, but only 0.363 cu in. of Inconel X.

On aluminum, Mr. Burke says his numerically controlled machines can remove three times as much metal in a shift as was possible with conventional machines. Maintenance time on the new machines is less than 8 per cent of gross machine time available—and 80 per cent of all maintenance downtime is for preventive measures.

• At Convair Div., Ft. Worth, Tex., General Dynamics Corp., numerical control has made possible a new fabricating technique.

"We used to build airplane bulkheads and wing ribs from as many as 100 separate parts. It took about 175 hours," relates J. B. Rankin, senior tool engineer. "Now we mill them from a solid piece of metal in about 20 hours." (See STEEL, June 6, p. 100.)

• You don't need a computer.

Wyman-Gordon Co., North Grafton, Mass., is cutting complex forging dies on a profile miller from tapes prepared by outside sources. The company's engineers transpose die dimensions into numerical manuscripts or punched cards and the tape source does the rest. Errors that occur in the finished tape are caught in trial runs and the tapes can be corrected easily.

Charles P. Gure, chief production engineer, says he believes numerically controlled diesinking will pay off in closer tolerance dies and reduced costs. "Once we have the control tape, repeatability is excellent," says Mr. Gure. So dies that wear out in a hurry, like those for forging titanium, are naturals for numerical control.

Five speakers at the K&T symposium (left to right): Francis Trecker, Kearney & Trecker Corp.; William D. Geist, Boeing Airplane Co.'s Applied Computer Service; Arthur Burke, McDonnell Aircraft Corp.; Fred Hill, Air Materiel Command (modernization program director); and J. J. Childs, Republic Aviation Corp.

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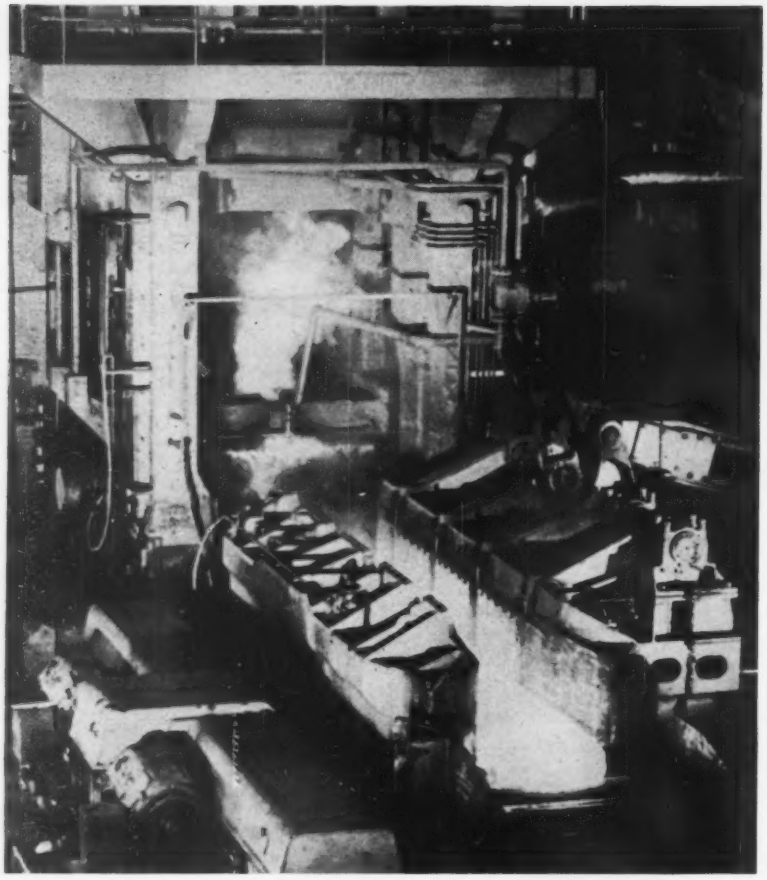

Universal slabber, put into operation at Fontana in 1959, is part of a $214 million expansion that boosts annual ingot capacity to almost 3 million tons

Soaking Pits Keep Pace With Kaiser Expansion

Their size and number have grown steadily as melting and rolling capacities increased; older, smaller pits have been rebuilt to handle bigger ingots

GROWTH of the Fontana (Calif.) plant of Kaiser Steel Corp. can be noted in the steady expansion of soaking pit capacity, says Merle L. Gruver, superintendent, blooming, slabbing, and structural mills.

Mr. Gruver described the evolution of the plant's primary rolling facilities at a meeting of the Association of Iron & Steel Engineers in Philadelphia.

• Number and size of soaking pits increased as rolling machinery was updated.

Originally (1943), twelve, 75 ton pits preheated ingots for direct rolling on a 110 in. plate mill. Now, 40 pits of 120 ton capacity heat ingots for a modified, 46 in., high lift bloomer and a 46 by 90 in. universal slabber. The soaking pit building is 1438 ft long vs. 475 ft before.

Additional batteries of 75 ton, bottom fired pits (two pits to a battery) were installed in 1948, 1950, and 1952. Installation of two, 120 ton pits in 1953 boosted the plant's annual ingot capacity to 1.5 million tons. That was maximum capacity with the company's one blooming mill.

• Decision to double ingot output (in 1956) made more pits and rolling machinery a must.

The universal mill was chosen because Kaiser anticipated an increased demand for steel in slab form. It was put into operation in late 1959.

Product forecasts dictated an increase in ingot sizes. New molds were designed to boost maximum ingot weight from 17 ingot tons to 20.

Soaking pits were rebuilt so each would hold 120 tons of ingots. In the smaller pits, insulating bricks were removed; the preheated air chamber and the wall between the chamber and the recuperator tubes were made narrower; and recuperator chambers were redesigned to permit a different tube layout.

Funds were available for additional soaking pits, but building limitations and limited engineering time made redesign impractical. The company decided to build ten more bottom fired, 120 ton pits.

• Soaking pit cranes were taken off auxiliary operations wherever possible to make for faster hauling of ingots.

Coking of pits, stripping of hot top ingots, servicing masonry repair crews, sanding of pit curbs, and removal of scale or debris from pit areas used an unreasonable amount of crane time. As annual capacity continued to climb toward 3 million tons, management looked for ways to free cranes from auxiliary service.

Alternate methods were tried for coking the pit bottoms, but the pit area wasn't accessible during periods of peak production. The solution: Use of dry pit bottoms, eliminating coking and bottom making. The company is considering alternate methods for sand handling and removal of pit debris, so crane workloads at the plant can be reduced still further.

550,000 POUNDS OF PRECISION

The Guillotine Shear's superior cut on heavy gauges, synchronized on the fly

Another Hallden First — type 76 Guillotine Flying Shear, the world's largest, for continuous strip shearing — up to 5/8" thick, 100" wide aluminum — at ***two cuts per second.*** This new Hallden installation can cut mild steel up to 3/8" thick and 90" wide, with cut lengths infinitely variable up to 48 feet. Change of cut length and synchronization may be made while the Shear is in operation. For every high-production shearing application consult the shearing specialists.

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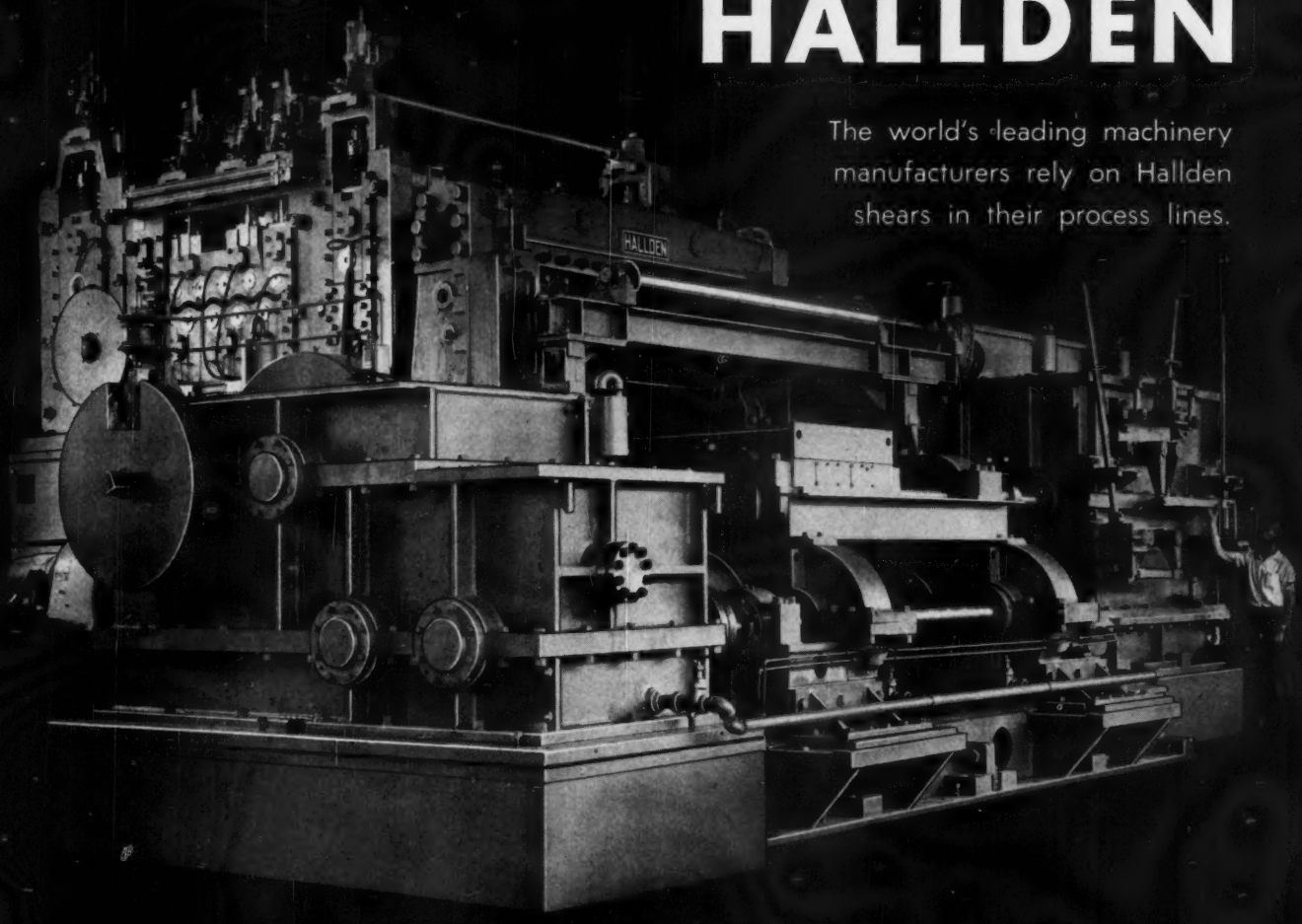
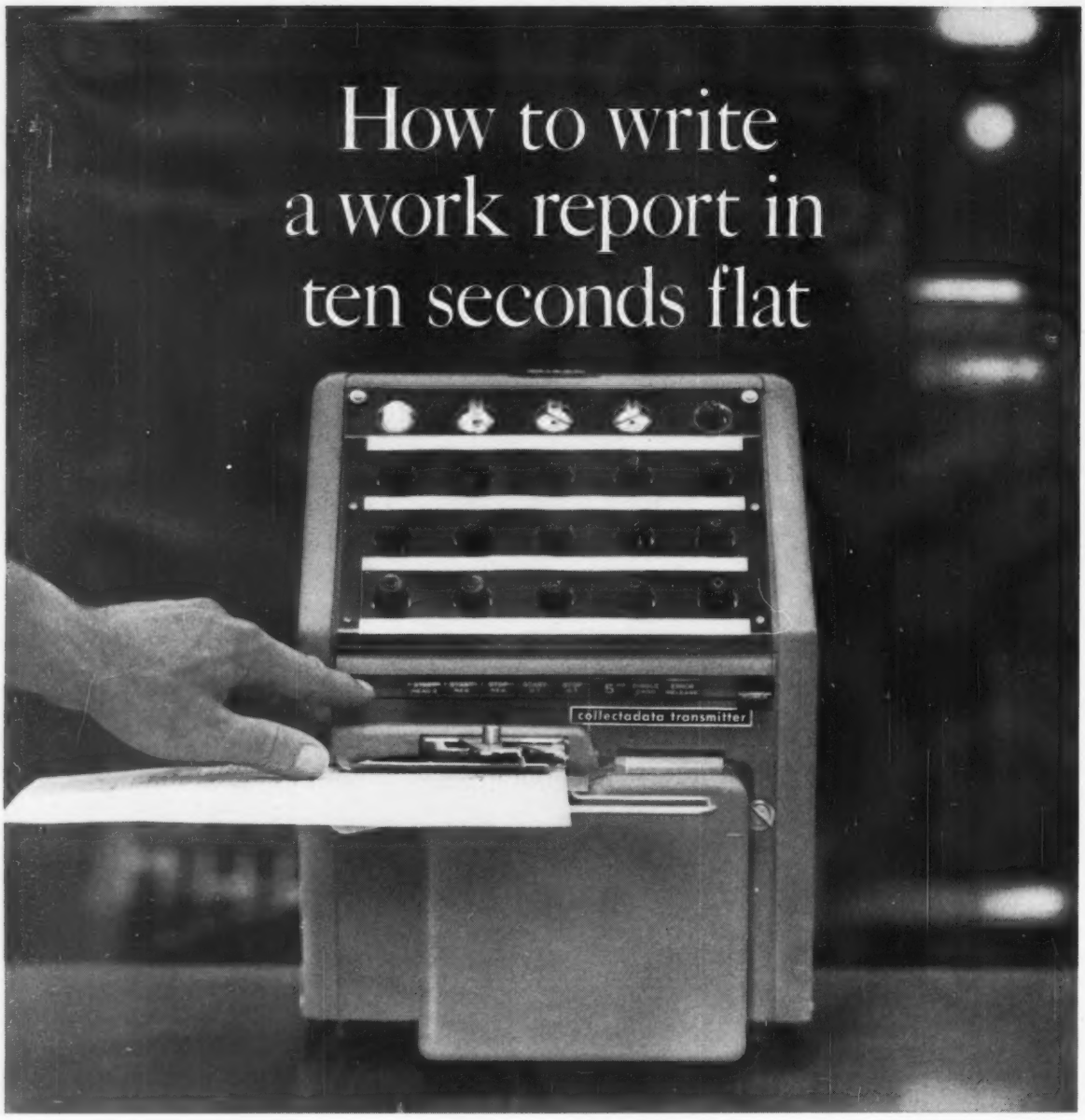
The world's leading machinery manufacturers rely on Hallden shears in their process lines.



THE HALLDEN MACHINE COMPANY • THOMASTON, CONNECTICUT

Associates: The W. H. A. Robertson & Co., Ltd., Bedford, England

How to write a work report in ten seconds flat



"Keeping track" is a fantastic problem in today's factory. Far and away the best (and cheapest) solution is a Friden Collectadata system. It works like this:

1) Work orders are issued in the form of tab cards or edge-punched documents.
2) When a job is completed, the worker puts his card in a Collectadata transmitter and touches a button.
3) The Collectadata receiver in the data center receives and automatically punches the information into a paper tape and records the time.
4) At day's end, the tape is processed—fed either into tape to tab card converter, or directly into computer to prepare a complete summary of work activity.

All plant activity — from receiving dock to shipping room — can be reported and recorded by this same simple method. For information, talk to your Friden Systems Man or write: Friden, Inc., San Leandro, Calif.

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Germanium Scrap Reclaimed New Way

AN AUTOMATED process for economically reclaiming high grade germanium scrap has been developed by High Purity Metals Inc., Hackensack, N. J., a division of Accurate Specialties Co. Inc.

A specially designed solid-gas reactor is the key to the process. It insures high quality, intrinsic germanium from which makers of semiconductors can pull single crystals, says the firm.

Four general types of material will be accepted from semiconductor manufacturers for processing: Crystal ends, high grade scrap, broken slices, or high grade sawdust (single crystal, polycrystalline, or doped germanium forms).

High Purity will reclaim such material on a toll basis or it will supply intrinsic, polycrystalline germanium of 40 ohm per centimeter or better resistivity rating on a scrap credit basis.

• Expansion of facilities to handle an estimated annual sales volume of $3 million a year has been started.

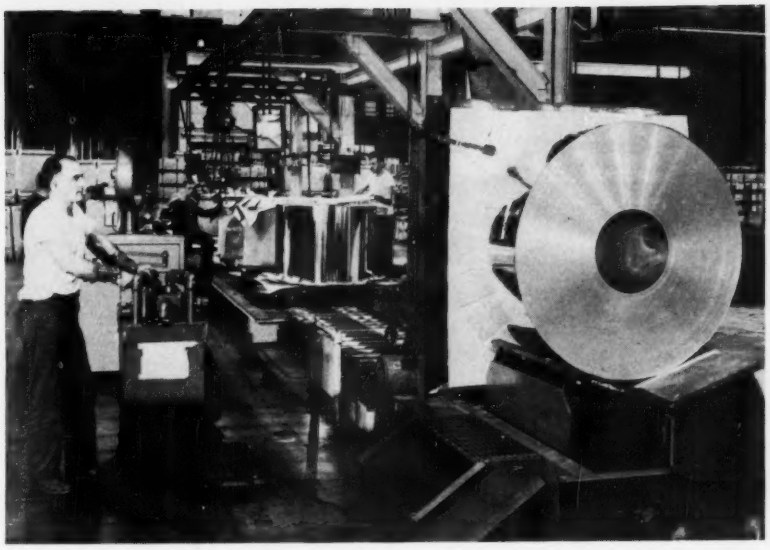
The company will supply a range of ingot sizes—up to 20 in. maximum length in weights from 50 to 120 grams per inch.

Delivery has been running two to three weeks from receipt of orders. As the expanded facilities become available, the company expects to inventory stock sizes for immediate shipment, it says.

Cuts Weld Contamination

Critical welds in heat exchangers can be kept free of airborne contaminants if you employ a portable, expandable "clean room," explains the Industrial Div., American Radiator & Standard Sanitary Corp., Detroit.

Such contaminants are particularly dangerous in making the high quality welds needed in heat exchanger tube bundles. The room is made with hardboard side panels with clear polyethylene tops, covered wagon style. They come in 6 ft lengths and are light enough to be quickly dismantled for storage.



Tilting device rotates 90 degrees to put a tin plate coil on end, on a wooden pallet; the coil is carried along the bundling line on a roller conveyor

Mechanized Banding Setup Expedites Coil Shipment

Tilter and roller conveyor carry tin plate through palletizing, weighing, wrapping, and banding operations; strapping tools are suspended from an overhead track

PRODUCERS of tin plate and galvanized strip are delivering increased tonnages to users in coil form. Handling equipment is being updated to accelerate the movement of material from processing lines to the warehouse or shipping dock.

Coils weighing 8 to 10 tons are palletized, weighed, wrapped, and banded in assembly line fashion in the tin plate mill at Weirton Steel Co., Weirton, W. Va., a division of National Steel Corp. Coil tilting and conveyor equipment were supplied by Logan Co., Louisville. Banding equipment was obtained from Signode Steel Strapping Co., Chicago.

The bundling system can handle up to 15 coils an hour.

• Roller conveyors carry coils from one work station to another.

Each coil from the processing lines is placed on the V-table of the tilting device, against a pallet and paper liners on the table's vertical member.

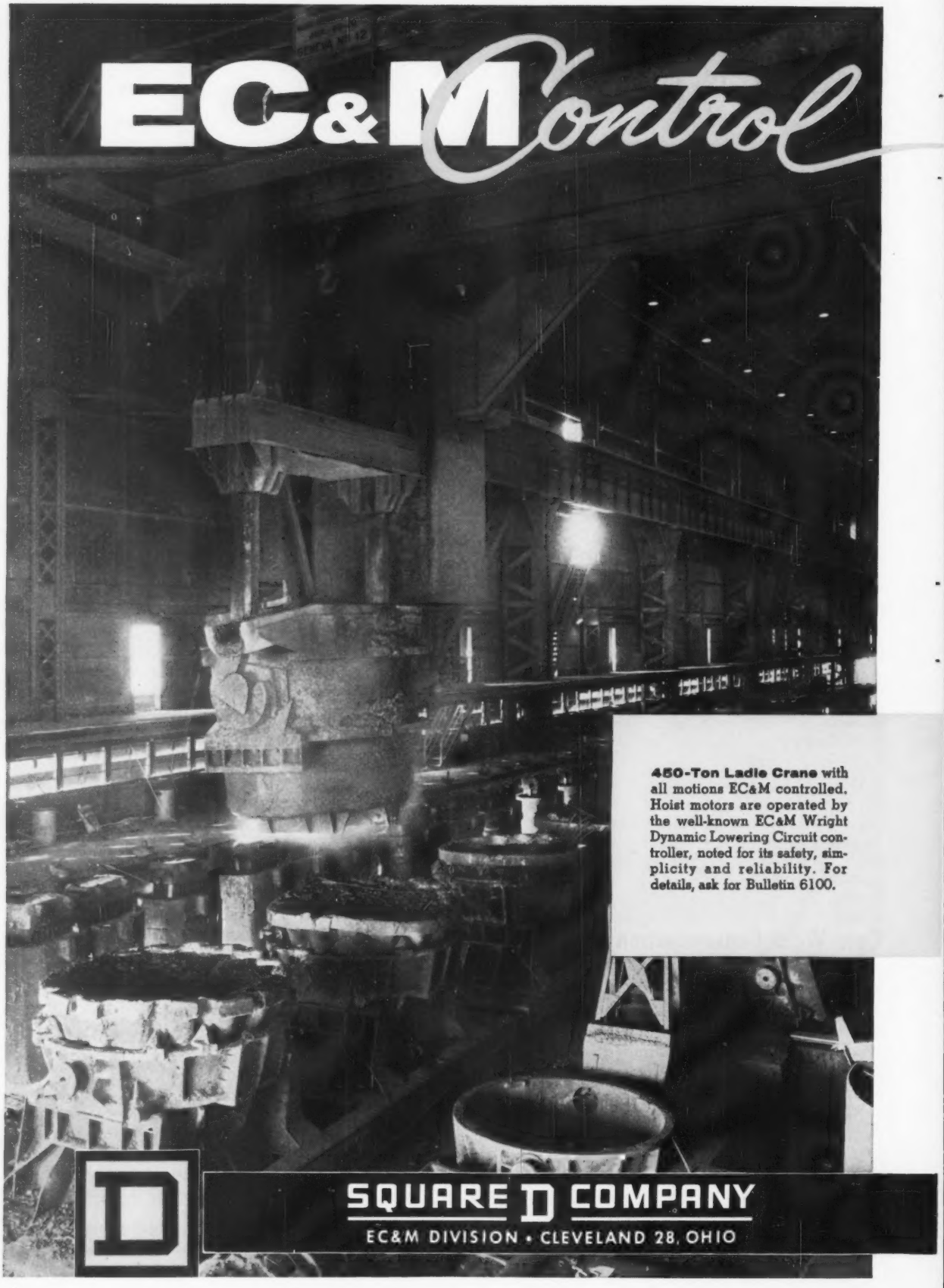
When the coil is tilted 90 degrees, rollers under the pallet are aligned with the roller conveyor track. The palletized coil is rolled to the weigh station, and the tilter is made ready for the next coil.

• Packaging is completed with the help of banding equipment mounted on overhead monorails.

Waterproof liners and outer protective cardboard are placed on the top of the coil and around it. Circumferential wrapping and banding are made easier by a turntable and by banding tools hanging from an overhead track.

The coil is then strapped securely to its pallet and hauled away by a fork lift truck.

EC&M Control



450-Ton Ladle Crane with all motions EC&M controlled. Hoist motors are operated by the well-known EC&M Wright Dynamic Lowering Circuit controller, noted for its safety, simplicity and reliability. For details, ask for Bulletin 6100.

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

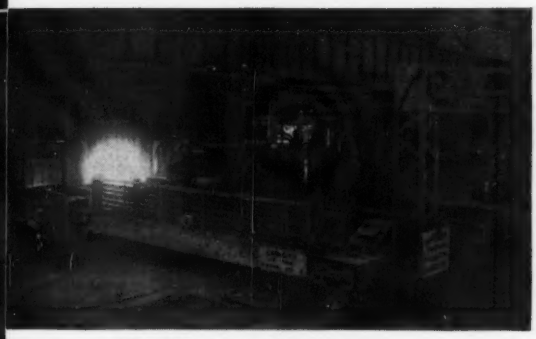
tames the giants at Columbia-Geneva!

KEEPING A TIGHT REIN on the toughest and most exacting operations at the Columbia-Geneva Works of United States Steel Corporation is the responsibility of EC&M control. Here, at Geneva, as well as throughout the metal-producing industry, EC&M control apparatus and engineering have earned a reputation for safe, reliable performance in basic steel making.

EC&M control is built to meet the rigid demands of open hearth and rolling mill departments. For cranes, charging machines and mill auxiliary drives, EC&M control equipment is unexcelled.

Operator's pulpit, overlooking the 132" reversing-rougher, contains EC&M Slider-Contact panels for automatic-positioning of horizontal and vertical rolls. Slider-Contacts may be moved up or down to change to new rolling schedules or to make minor adjustments quickly when rolls are changed. Roller operates a single push button to produce products rolled to accurate tolerances. For complete facts, write for Bulletin 6550.

EC&M 65-inch Type SW all-welded lifting magnet on overhead crane successfully withstands wide temperature changes in handling crop-ends from cooling pits. Bulletin 1300 describes EC&M lifting magnets for steel mill service.



The tough service encountered on charging machines is the acid-test of EC&M control. Here, highly repetitive operation under maximum loading brings out the long-life qualities of EC&M Line-Arc magnetic contactor control.

FOR BASIC STEEL MAKING, IT'S EC&M CONTROL

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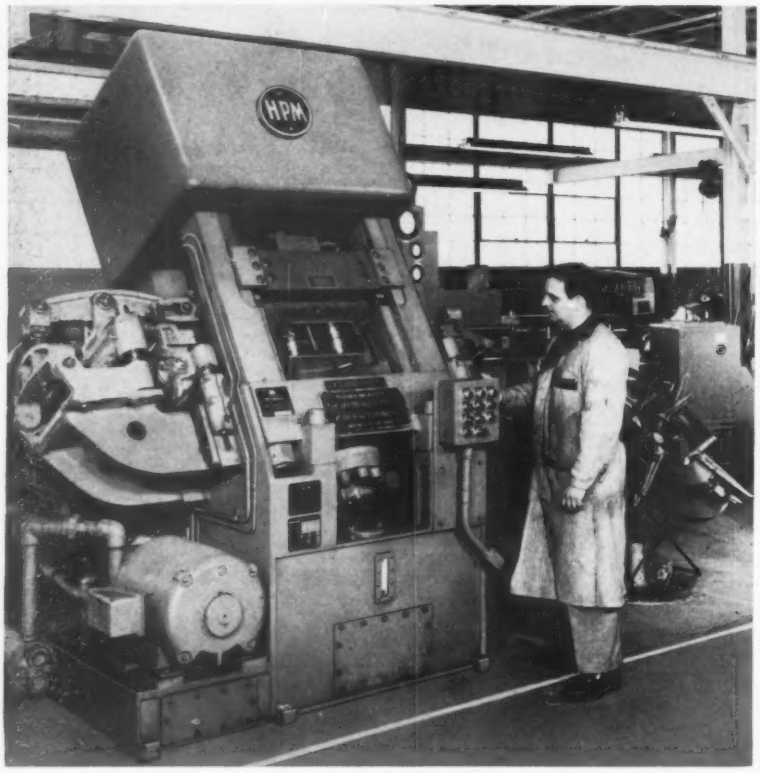
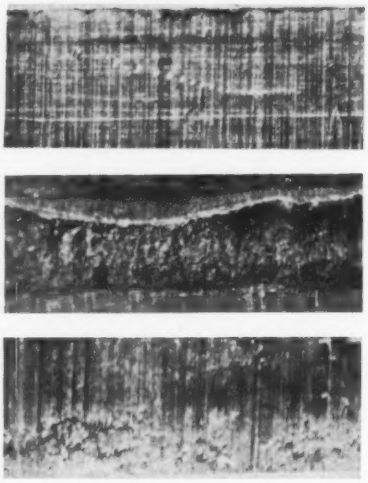
Stamping Edges Come Out Straight and Smooth



Coil stock moves into a special set of dies in this HPM press, and smooth edged parts come out at rates up to 120 a minute. The technique works equally well on coil or strip stock



These unretouched views show the effect of Smooth-Edge on stamped edges. All are magnified eight times. At top, smooth edge. Center, conventional stamped edge. Bottom, shaved edge

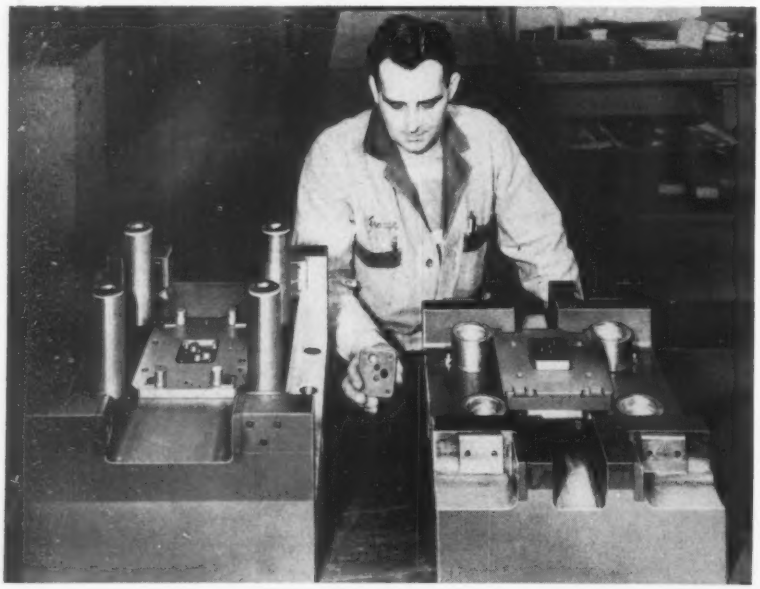
SPECIAL dies in a triple action, high speed hydraulic press are turning out precision stamped blanks with straight, smooth edges at rates up to 120 a minute.

The die technique, developed by Hydro-Cam Engineering Co., Troy, Mich., holds the material firmly during the shearing sequence. Material along the line of shear is restricted from flowing or tearing.

• **Cost Cutter**—The manufacturer says the new process, called Smooth-Edge, can eliminate shaving operations normally required to provide a stamped blank with a smooth, straight edge.

The surface finish produced in the blank edge in one stroke has been compared to a ground surface. Hydro-Cam says the technique can hold accuracies of 0.0005 in. or closer. Most likely applications: Parts that require smooth, accurate edges, such as gears, gear racks, pieces with precision holes or contours, and small extrusions.

The process has been used on steel parts with a wide range of hardnesses. Brass, aluminum, and copper have also been worked.



Here is a typical Smooth-Edge blanking die, opened to show construction details. The die produces the O-ring seal plate held by the engineer

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20% MORE LINEAL FOOT YIELD / **20%** MORE MACHINE WRAPPING EFFICIENCY / **20%** MORE STORAGE SPACE FOR OTHER NEEDS

New, exclusive Thilco LP (Longitudinal Pleating) provides two-way stretch, adds approximately 20% more lineal foot yield to Standard creped grades. This added footage per roll increases machine coil wrapping efficiency by 20% — cuts downtime by reducing the number of roll change-overs, and saves another 20% on storage space. LP increases wrapper flexibility and is especially advantageous for packaging small circumference coils. All Thilco Coil Wraps are available *with* or *without* pleating in standard widths 3" to 5½" or in special widths to order. All can also be trade-mark Print Decorated. Write for details.

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2. ASPHALT LAMINATED — REINFORCED
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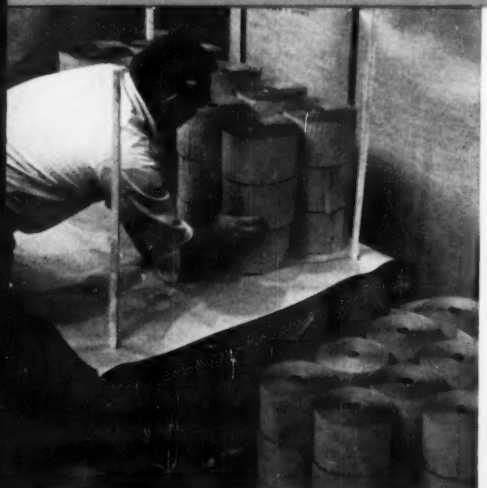
5. CREPED KRAFT (Plus Custom Grades)

NEW CREPED WEIGHTS

Now available in basis weights up to 80 lb./50 lb./60 lb. laminated (50% heavier than previous available weights) or 90 lb. Single-Ply, creped up to 50% stretch.



NEW PALLET LOAD "PUT-UP"

Saves Handling Costs — Increases Efficiency by 20%

Thilco Coil Wraps are compactly stacked on pallets, spindled on dowels at corners, interleaved with Thilco heavy-duty Kraft at 4-roll layer intervals to reduce shifting, then wrapped with an abrasion resistant, waterproof Thilco WRAP-DRI paper blanket which produces a sturdy, weather-resistant packaged unit. This new "pallet packing" method reduces handling costs, saves approximately 20% on storage space, provides immediate on-sight inventory and increases efficiency generally. There are many other advantages you'll want to learn about.

Write for Thilco Brochure containing Coil Wrap Samples and complete descriptive information.

THILCO PAPERS INCLUDE:

- **WRAP-DRI** Waterproof protective papers
- **THILCO-TUF** Stainproof laminated papers
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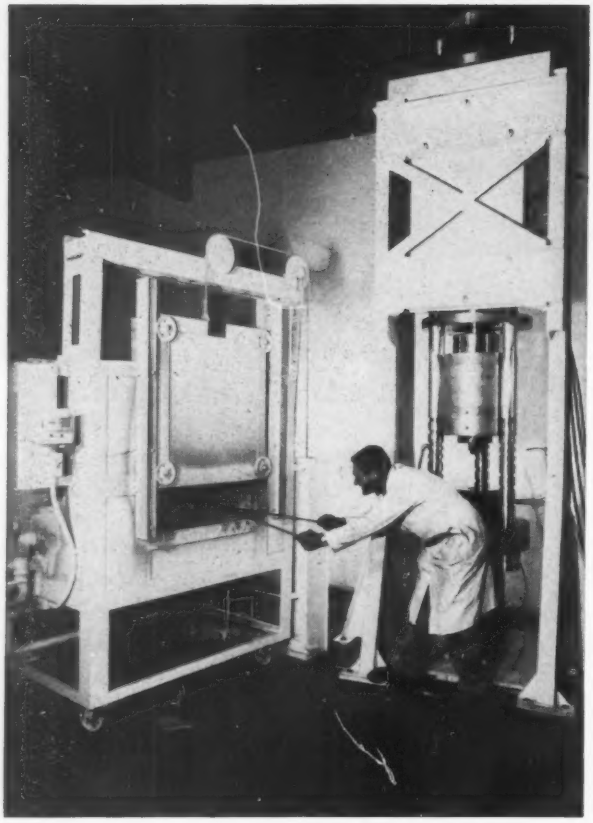
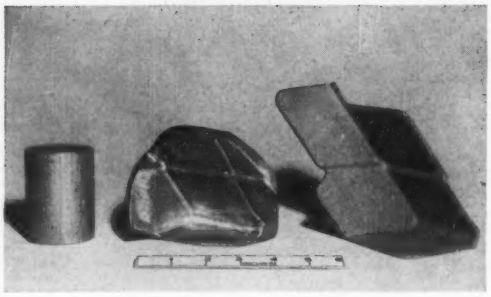


Operator removes billet from heating furnace for vertical Dynapak (rear). Cycling time can be made rapid enough for automatic feeding and handling. Machines require no special mounting; noise can't be heard through ordinary cement block wall



Fuel tight corner for an airplane tank demonstrates potential of metal movement with Dynapak. Starting with 2¼ in. billet (left), part is first blocked then finished in a two-cavity die to within 0.010 in. Technique eliminates 50 per cent of conventional setup time and tooling costs. Compare that with a conventional forging (below) which cost another $85 for machining plus $2800 for tooling

Small Shop Specializes In 'Impossible' Forgings

Even refractory metals are being handled with high energy rate method on a production basis by a West Coast shop. Low machinery investment cited as major benefit

SMALL OR MEDIUM size shops can turn out big pieces with a comparatively modest investment in high energy rate equipment, says Jim Rork, president, Precision Forge Co., Los Angeles.

He claims his company's $100,000 Dynapak can outdo a $500,000 conventional installation. "Our machine can develop 140,000 ft-lb of energy without creating problems relating to noise, zoning, or dirt," he says. Some models can develop more than 1.5 million ft-lb.

Here are some things his company is doing:

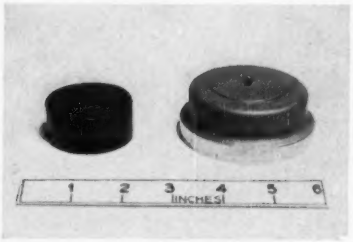
- Making fuel tight corners for aircraft from Type 2014 aluminum which require no finish machining (tolerances are within 0.010 in.).
- Making turbine blades of aluminum bronze within a tolerance of 0.003 in.
- Making hat shaped pieces of H-218 steel with a web or brim thickness of 1/32 in. (The company starts with a 3 in. disc.)

Parts being considered are even more complex and will require high structural integrity.

• High energy rate machines like Dynapak take advantage of the plastic behavior of hard, tough, or brittle metals, when they are hit with abnormally high pressure flows. Compared with conventional methods, Dynapak makes possible closer tolerances, thinner sections, finer surface finishes, smaller radiuses, and occasionally, better metallurgical properties.

The method can cut machining by 70 per cent, experts feel. A study of 28 conventional aircraft

Housing bell made of SAE 4340 is an example of no draft, high velocity forging. Part could not be forged conventionally, says Precision Forge. Previous practice: Machine from a forged billet at a cost of $125, with a loss of half the material. Dynapak produces part to exact size. Metallurgical examination shows grain size is No. 11 compared with No. 4 in the conventional forging



High velocity forging of 19-9 DL stainless makes possible no draft shape like this heavy rimmed cup. Advantages: 60 per cent less material, 50 per cent less tooling cost, 50 per cent less machining time

forgings by Precision Forge showed that an average of 296 lb out of a forging weight of 383 lb ended up as chips.

The company expects to forge these metals: Titanium (6 Al-4V), SAE 4340, PH 15-7 Mo (Armco), Vascojet, H-11, and the refractory metals.

• Even brittle metals apparently react with a sort of "quasi-viscous" or plastic behavior when they're hit by a ram traveling at more than 1000 in. per second.

Applying high energies at high velocities is an important factor in getting forging costs down while improving quality, says Mr. Rork. "Taking advantage of the plastic behavior under those conditions offers great promise in making forgings from materials most people claimed couldn't be fabricated by any technique."

Submicron Fumes Extracted In Flooded Disc Scrubber

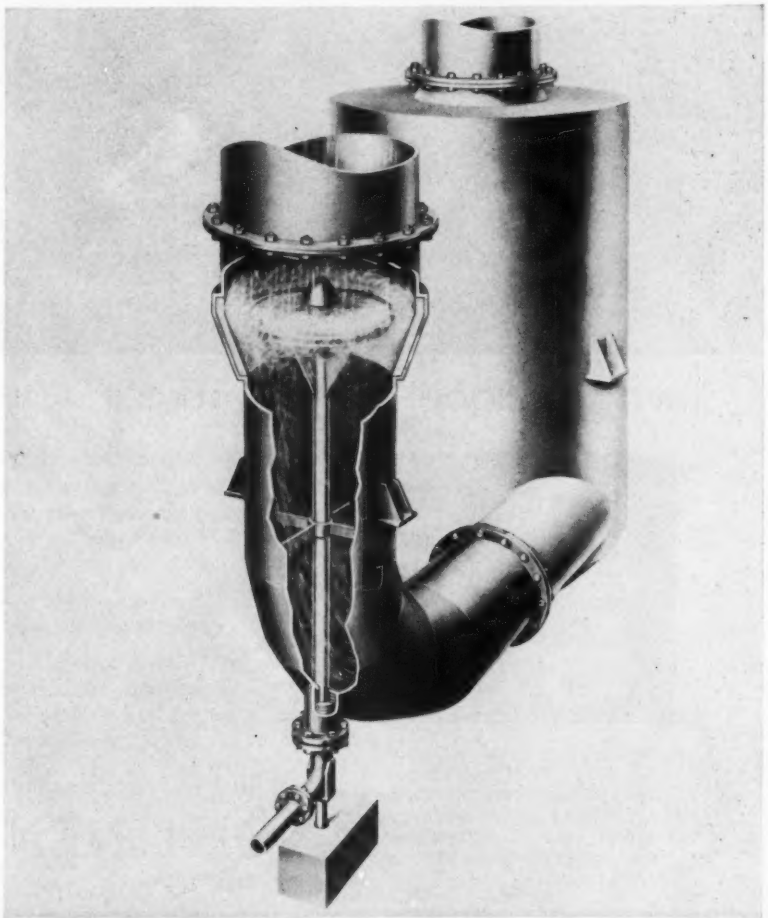
COLLECTION of ultrafine particles from exhaust gases is said to be simplified with a flooded disc scrubber developed by Research-Cottrell Inc., Bound Brook, N. J.

Current models, automatically adjustable for varying plant conditions, are designed to extract submicron fumes from gases given off by steelmaking furnaces and chemical processes.

• How It Works—Turbulent flow of a gas-liquid provides intimate, violent contact between dust and liquid particles. Water (or other liquid) passes through the stem of the disc support and into the gas duct at the center of the disc. Water is deflected to the rim of the disc, mixed with incoming gas in the space between the duct and disc and broken into tiny particles that adhere to the dust fumes.

Repeated collisions of the mixture agglomerate and enlarge the particles, which are separated and collected in a cyclonic eliminator.

The conical shape of the duct around the disc permits compensation for gas flow variations. As the disc moves upward, the gas inlet becomes larger; downward movement makes the opening smaller.



Water passing through the center of the disc is deflected to the rim, mixed with incoming gas, and disintegrated; dust particles are trapped in the mist

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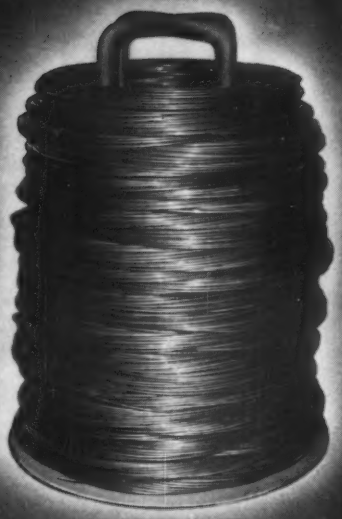
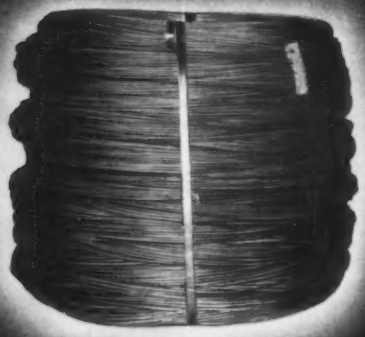


comes in Continental's cost-saving packages



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LEVERPAK, the modern drum container for 12 gauge through 24 gauge, where wire must be kept clean and dry . . . and safe from handling damage. Provides long uninterrupted runs. (Finer gages than above also possible for Leverpak, on inquiry.)

Econo-Coil® Reel unwinds 1500# to 2500# *nonstop,* depending on finish and gage . . . the single length wire that slashes stop-and-go coil changing time, and cuts scrap loss as much as 90 percent! Econo-Coils® are shipped on returnable reels which stack for easy handling when full, or nest when empty to save space.

Econo-Coil® *Reel-less*—If you prefer you can specify Econo-Coils® individually bundled and strapped without reels.

Econo-Coils® can be furnished in a wide range of gages, in many finishes, tempers, and analyses of low and medium low carbon steels. Let us show you how we have helped others speed output and cut production costs . . . with Econo-Coil.®

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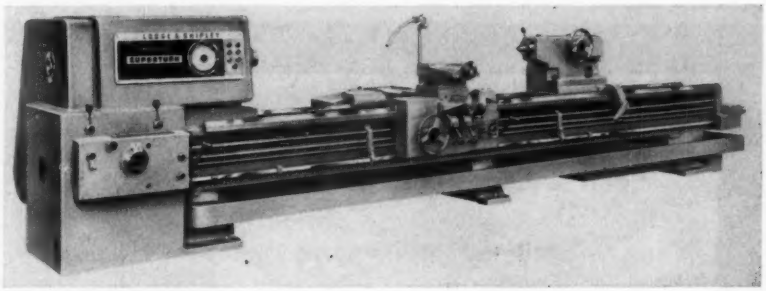
20 in. Lathe Can Handle Ceramic Tooling

THE 2516 (20 in.) Superturn Preselect lathe has four way power, rapid traverse. This addition to the Lodge & Shipley line is designed for handling such things as ceramic tooling. Among its features are higher horsepower and strength.

A power shifting, preselect headstock provides 32 forward speeds and positive brake. Index plates indicate spindle speed, cut speed, and maximum safe horsepower cut. A single handwheel preselects spindle speed and cut speed simultaneously. Six preset indicator tabs facilitate dial setting for preselected speeds. Pushbuttons at the headstock and on the apron control power shifting of the headstock.



Other developments include a 0210 power squaring shear ($\frac{1}{8}$ in. x 10 ft capacity), a self-aligning back gage on the 0410 power squaring shear, a modulated feed tracer on the 2013 (16 in.) Powerturn 90 Degree Copymatic lathe; an automatic machining cycle on the 2013 (16 in.) Powerturn 45 Degree Copymatic lathe; a compact carriage mounted hydraulic tank on a Powerturn 45 Degree Copymatic; and a constant cutting speed attachment on the 1307 (10 in.) Hi-Turn lathe.

The units will be shown in Chicago at The Machine Tool Exposition—1960 (Booth 1046).

For further information, *write* Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

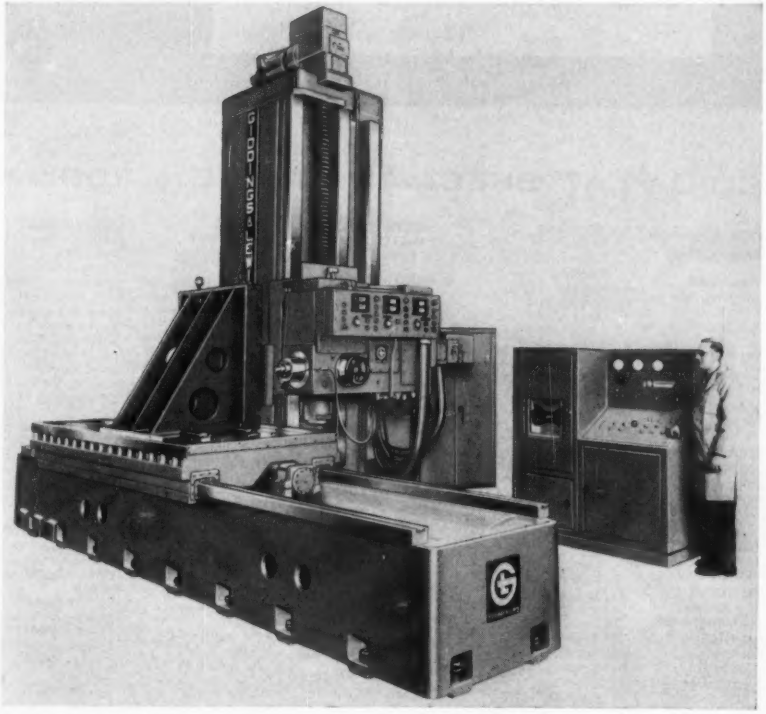
Die Sinking, Milling Unit Has Numerical Control

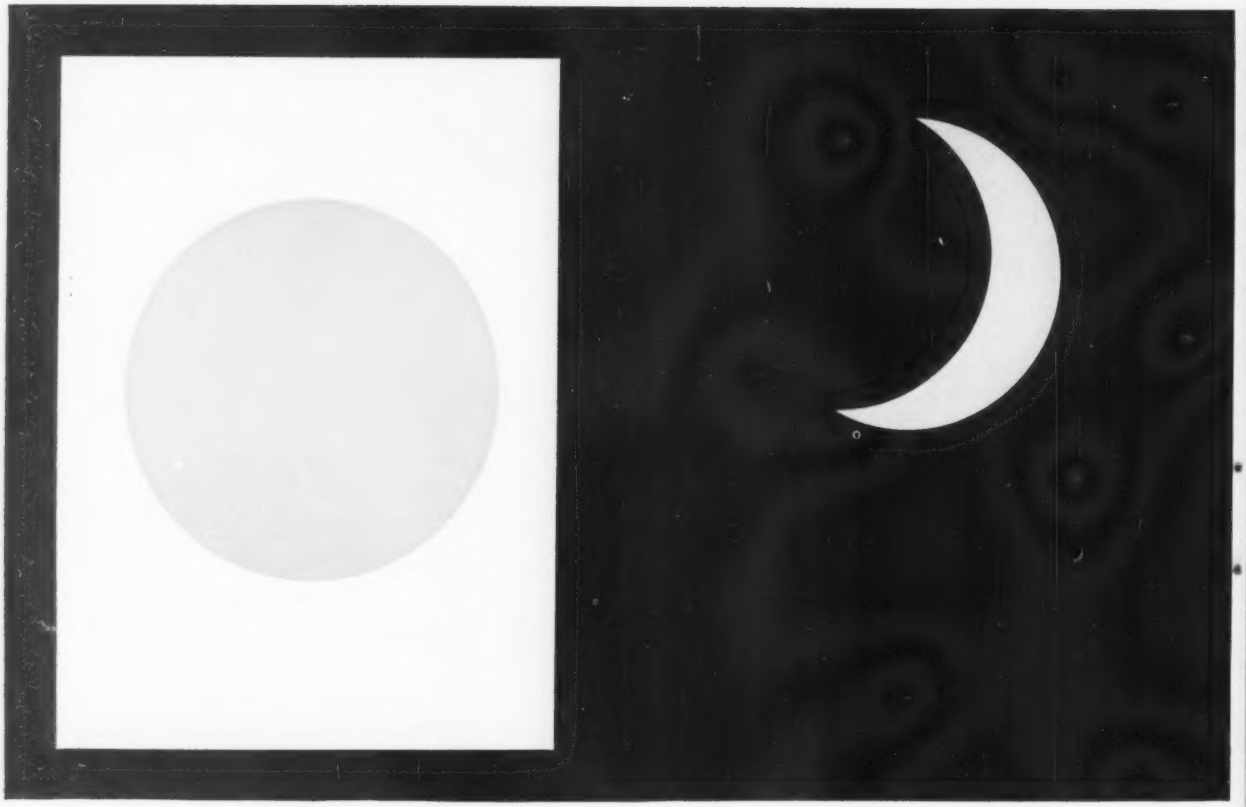
THIS horizontal die sinking and contour milling machine (DiMil) operates under Giddings & Lewis Numeripath magnetic tape control. The manufacturer claims the unit can be operated at speeds up to 25 per cent faster than tracer controlled machines without sacrificing tool life.

By comparison with the template method of producing dies, the company reports a reduction in total manufacturing time up to 50 per cent on specific jobs.

Horizontal design provides added capacity for machining deep dies and enables the operator to see the cut at all times. It also provides gravity drop for chips.

The unit has a work range of 72 in. vertical travel and 18 in. depth travel to the headstock. The 48 x 98 in. worktable has 84 in. of travel. Milling feed ranges with tape control are 0 to 60 in. per minute (infinitely variable). Rapid traverse rate is 90 in. per minute. The





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head has 32 spindle speeds from 8½ to 1800 rpm and has a 7½ in. diameter quill, No. 50 milling machine taper, and power drawbolt in the spindle.

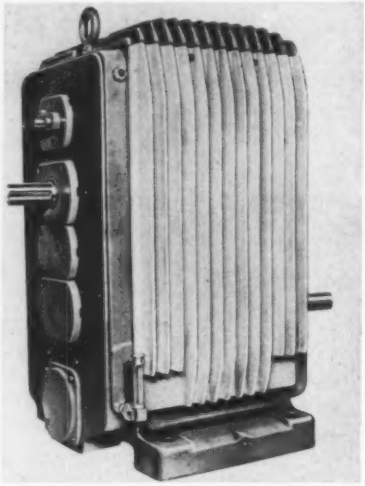
Other equipment includes a 3 in. spindle jig borer and milling machine that can do heavy duty milling; a 5 in. spindle horizontal boring, drilling, and milling machine; 9 and 11 in. column radial drilling machines; and a 30 in. upright drill. The units will be shown in Chicago at The Machine Tool Exposition—1960, Booth 1320.

For further information, *write* Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Variable Speed Drive Meets Capacities to 50 hp

A CONSTANT horsepower, variable speed drive is designed to meet capacities up to 50 hp and ratios up to 5.5:1. The drives (Type RS-33) are compact and give simple, quick, and precise speed control and meet infinite speed varying requirements.

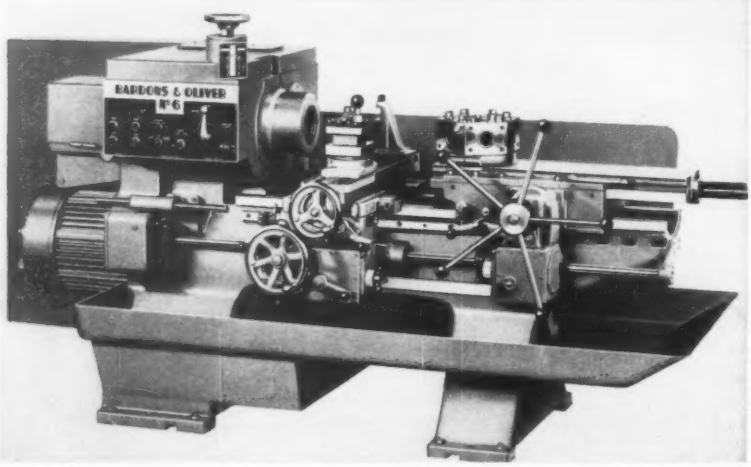
Drives of 3.8:1 and less can be directly coupled to a 1750 rpm motor. The five available types include basic drive, basic drive with



output gears, basic drive with input and output gears, basic drive with integral foot type motor, and basic drive with integral foot type motor and output gears.

The units have twin strands of single roll chain operating between a pair of facing wheels having a floating center disc. The effective diameters of the wheel faces are altered during operation, changing the ratio and the output shaft speed.

For further information, *write* Dept. PR, Link-Belt Co., Prudential Plaza, Chicago 1, Ill.



FEATURED ON THIS RAM TYPE TURRET LATHE are a 3 in. spindle capacity for heavy duty bar work, a 5 in. spindle capacity for light duty bar work, and a 21 1/8 in. swing over the bed ways. The headstock provides 16 geared spindle speeds, constant horsepower (optional to 30) at all speeds, 50 to 1 speed range, spindle speed preselection, and automatic spindle speed changes. Twelve fast feed changes are provided for the cross slide, carriage, and hexagon turret. For further information, **write** Bardons & Oliver Inc., 1133 W. Ninth St., Cleveland, Ohio

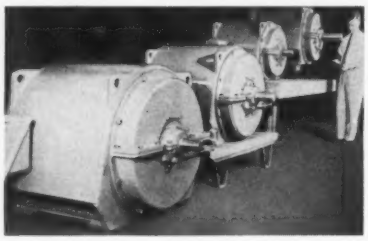
Redesigned Motor Line Has Ratings Through 1000 hp

SQUIRREL cage motors rated from 250 through 1000 hp have compact, smoothly contoured, steel plate enclosures which are strong and highly corrosion resistant.

Four lifting eyes are integral parts of the frame ends. Mounting space is reduced by positioning the feet under the frame overhang. The two piece, flat steel endplates facilitate disassembly for bearing inspection. You can get the unit in 440, 550, 2300, and 4160 volts, 60 cycles.

The entire range of ratings can be supplied with full load speed of 3500, 1750, or 1160 rpm; 870 and 690 rpm motors are available through 700 hp, and 575 rpm motors through 500 hp.

Sleeve bearing models can be furnished in the entire range of speeds and ratings; ball bearing models



through 400 hp, all speeds, and through 900 hp at some of the lower speeds.

For further information, *write* Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo.

Automatic Features on Grinders Emphasized

SEVEN new or improved precision disc grinders have been announced by Gardner Machine Co. Six grinders use two abrasive discs to simultaneously grind parallel, opposed work faces. Three of the machines are designed to do that even though areas of the opposed sides are unequal.

Automatic functioning without operator guidance is emphasized. Automatic features include loading of work into a carrier, dressing of abrasive discs, gaging of parts and adjusting of the machine to maintain tolerances, and workpiece positioning and discharge. Manual opera-

When you think of
FLEXIBILITY

Lucas provides

Lever control.

Pendant control

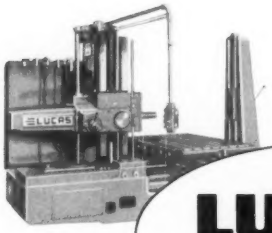
Tape control

and a variety of combinations of the three for flexibility of control suited to the type of work required.

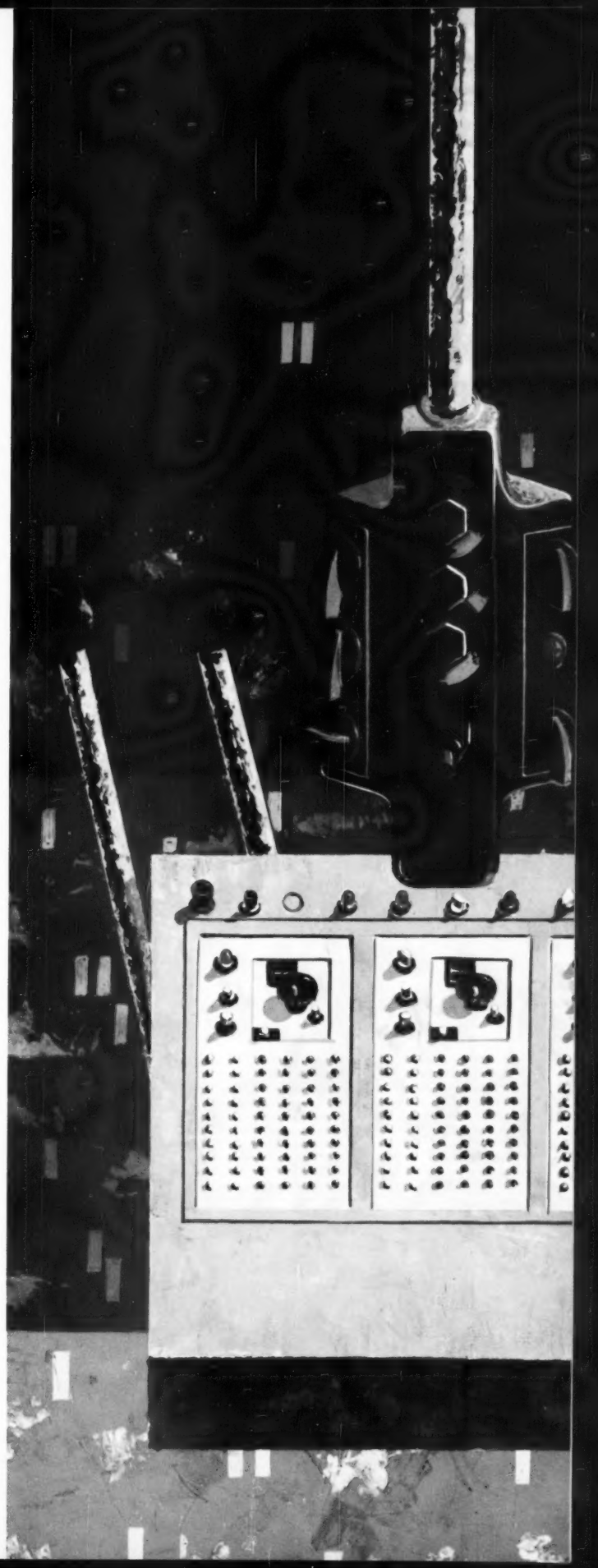
For example . . . The Multiple Control Pendant selects speeds, feeds, unit travels, rapid traverse of head, table, saddle and spindle, plus the rotation of the spindle forward and reverse, jog and stop. Speeds and feeds can be pre-selected while the machine is in operation.

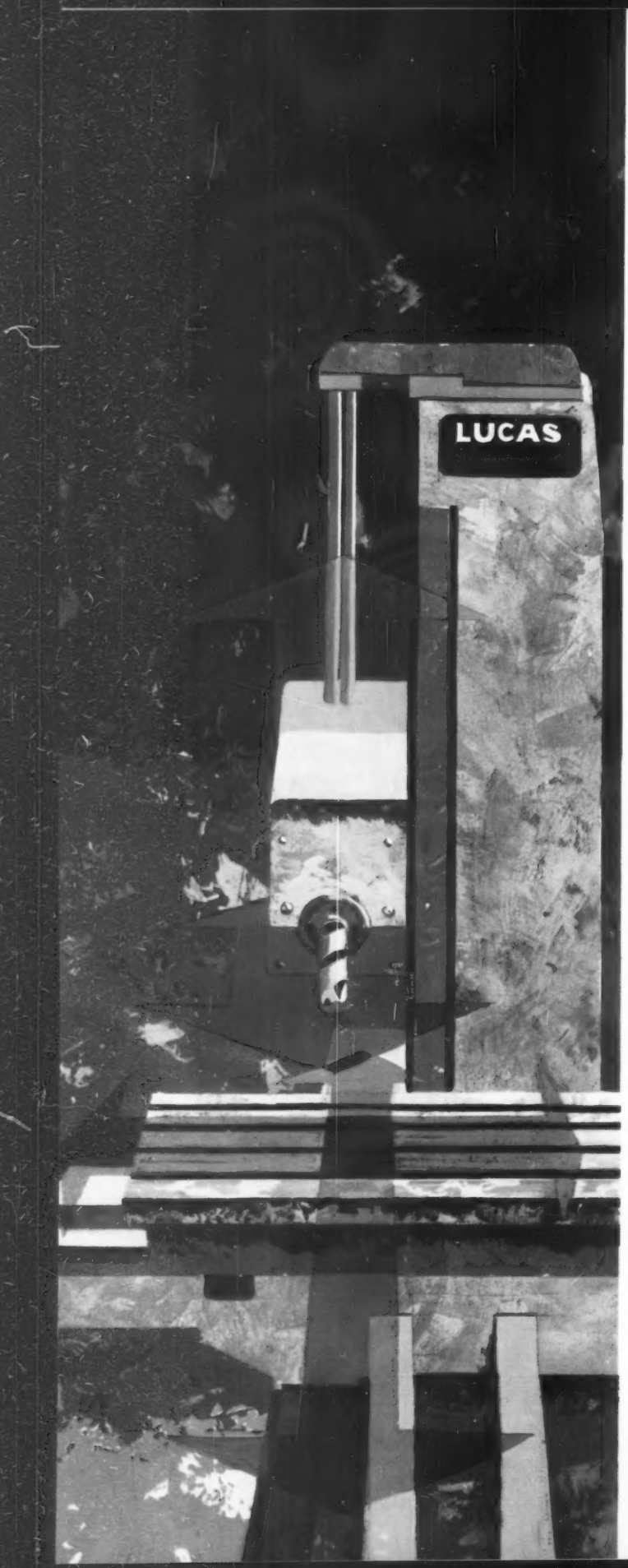
Practical applications of these controls are spelled out in a new catalog. Write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of flexibility . . .

think of . . .



LUCAS
PRECISION





When you think of VERSATILITY

Lucas feeds the saddle ⇐

Lucas feeds the spindle ⇒

Feeds both in combination ⇒⇐

when necessary.

Combine these motions with

Vertical spindle head travel ⇕

and horizontal table travel ⇔

and a rotary table ↻

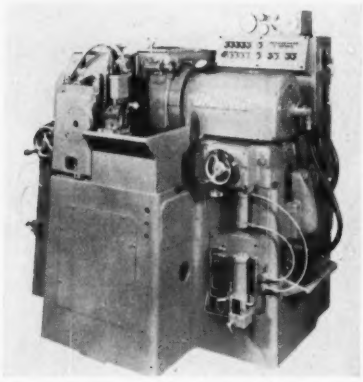
if you need it.

The result . . . no machine tool can offer a greater combination of usable motions for boring, drilling, milling and related work.

Over twenty models and a dozen major attachments. Write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of versatility . . .

think of . . .

LUCAS
PRECISION



Model 2H10 grinds small parts to millionths tolerances at rates of 5000 to 6000 an hour

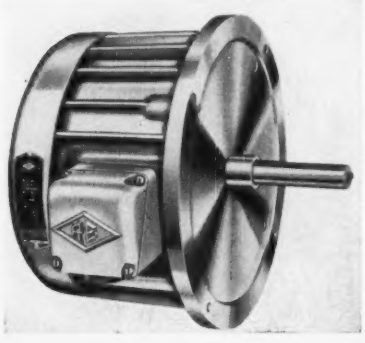
tions in four models are restricted to loading and disc dressing. Those two operations are automatic in three of the grinders which are completely automatic.

Other characteristics of the grinders are quick and easy setup, wheel changing without disturbing setup, stability, rigidity, acceptance of automation units, and ease of maintenance. The units will be shown in Chicago at The Machine Tool Exposition—1960.

For further information, *write* Gardner Machine Co., Beloit, Wis.

Machine Tool Motors Have 15 and 20 hp Ratings

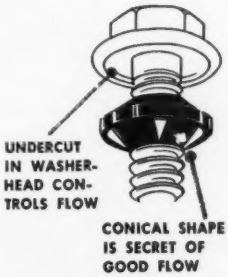
THE MACHINE tool motors in the Reuland 1400 Series have newly designed frames and come in 15 and 20 hp ratings. Rotors are dynamically balanced and mounted between two heavy duty ball bearings. A special radial air gap design with a light, thin, low inertia rotor pro-



One of the outstanding advantages of Townsend Tuff Tite fasteners is that they provide an economical means for leakproof joining of metal, asbestos, porcelain or plastic. The pre-assembled conical neoprene washers flow into the holes as the fasteners are seated, filling them and making waterproof seals. Tuff Tites are effective for any application requiring leakproof joints, such as those needed in the construction or appliance industries.

Tuff Tite advantages include ease and economy of installation, surface protection and vibration resistance. Standard items are immediately available from jobbers and warehouses. Tuff Tites are also available in numerous special designs to suit any application need.

If you are joining metal, plastic, porcelain or asbestos, you should know about Townsend Tuff Tites. Ask your Townsend representative, or we will send you complete literature. Townsend Company, Engineered Fasteners Division, P.O. Box 71-C, Ellwood City, Pa.



Townsend Company

ESTABLISHED 1816

Engineered Fasteners Division

ELLWOOD CITY · PENNSYLVANIA

Cherry Rivet Division · Santa Ana, California

In Canada: Parmenter & Bulloch Manufacturing Company, Limited, Gananoque, Ontario

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set
your line
with extra
sales bait

TI-CO® NON-FLAKING GALVANIZED SHEETS

for CORROSION RESISTANCE

Anywhere there's a corrosion problem . . . there's a place for INLAND TI-CO! More and more, makers of famous-name appliances, producers of farm equipment, manufacturers of thousands of products which must withstand moisture-laden atmospheres, in or out-of-doors, are recognizing non-flaking TI-CO as the standard of excellence in galvanized sheets. ■ TI-CO galvanized sheets keep your product components functioning longer and add years to the appearance of the finished product . . . giving consumers greater value and adding "sales bait" to your product line.

INLAND STEEL COMPANY 30 West Monroe Street • Chicago 3, Illinois Sales Offices: *Chicago • Davenport • Detroit Houston • Indianapolis • Kansas City • Milwaukee • New York • St. Louis • St. Paul*

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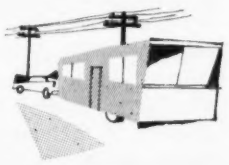


TI-CO protects families, too, in modern house trailers. Thousands of these compact, mobile homes have roofs made of this non-flaking galvanized sheet.

Years of corrosion-resisting service are added to washers, dryers, refrigerators and other appliances whose parts are made of non-flaking TI-CO.

Poultry feeders and other farm equipment subjected to weather and abusive chemicals last longer when made of non-flaking TI-CO.

vides smooth start, quick stop operation.

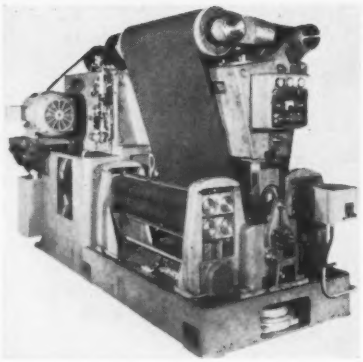
The fin type, cast aluminum frames permit rapid heat dissipation. Available are TEFC and TENV types, for continuous or intermittent duty.

For further information, *write* Reuland Electric Co., Alhambra, Calif., or Howell, Mich.

Abrasive Belt Grinder Has Three Roll Head

SIZE control, fine finish, and high production are combined in a three roll abrasive belt grinding and polishing machine. It's compact enough for in-line installations (such as coil grinding) without loss of rigidity, cutting qualities, or power needed for fine finish work.

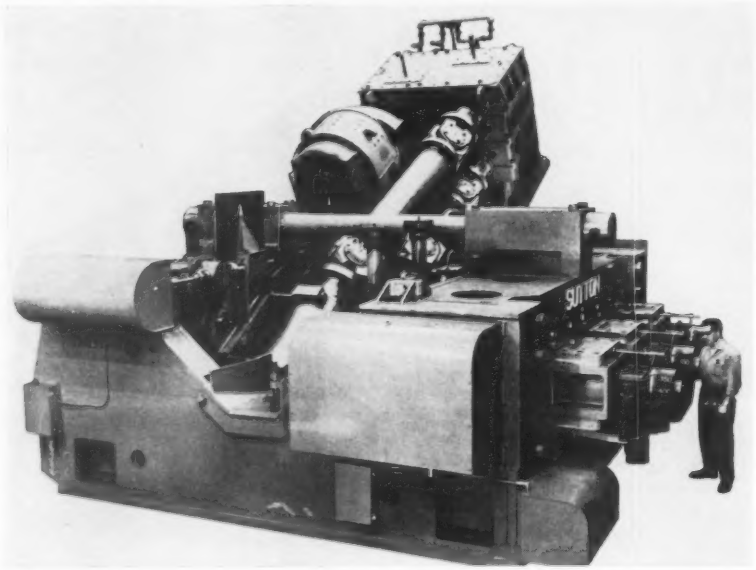
It has up to 150 hp on the belt drive. The tensioned cast Meehanite main support arm helps assure positive close grinding control without vibration. The head, including rolls,



belt, tracking and tensioning devices, and electronic timer, is designed as a unit. It can be used on pinch roll machines, reciprocating table units, conveyor type applications, and way and column combinations. The design adapts to wet and dry grinding. Large windowed doors allow access to functional parts.

It can accurately grind a wide variety of work requiring critical thickness tolerances. You can obtain belts in widths of 36, 48, 60, and 72 in.

For further information, *write* Mattison Machine Works, Rockford, Ill.

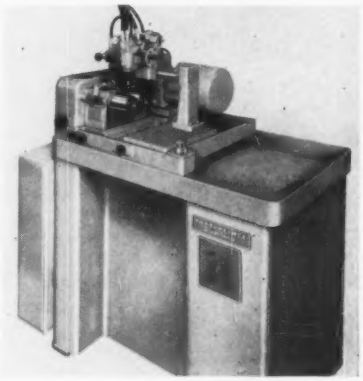


BARS UP TO 12 IN. IN DIAMETER CAN BE PRECISION STRAIGHTENED on the Sutton 5BC roll straightening machine. It's powered by a 250 hp, adjustable speed, dc motor. Speed is 30 to 90 fpm. The unit is motorized and equipped with remote control for one man operation. It uses the five roll principle. A central pressure roll is located between two sets of opposed rolls. Each set has one driven roll and one idler roll. For further information, **write** Sutton Engineering Co., First National Bank Bldg., Pittsburgh 22, Pa.

Microstoning Machine Finishes Small Parts

WITH a centerless, plunge cut, microstoning machine you can do high production finishing of small parts. The self-contained unit (Taft-Peirce Supfina No. 86) operates with an automatic work cycle.

It finishes the outside diameter of all types of small parts which require a fine microinch finish, precise form accuracy, and sound surface structure. The machine microstones parts by turning between two



rotating rolls where they are in contact with a rapidly oscillating abrasive stone. Depending on part material, hardness, and initial roughness, it is reported that surface finishes down to 1 microinch can be generated with simultaneous out of roundness correction of 75 per cent or better. Workpieces up to 2 in. long and varying in diameter from $\frac{1}{8}$ to $1\frac{1}{8}$ in. can be finished. The company is exhibiting at The Machine Tool Exposition—1960.

For further information, *write* Taft-Peirce Mfg. Co., Mechanic Avenue, Woonsocket, R. I.

Electromagnetic Clutch Is Multiple Disc Type

FRICTION elements in a line of electromagnetic, multiple disc clutches are placed on the outside diameter of the magnet body. That makes possible a long torque arm for a given size unit and increases the friction area.

The unit has 2, 4, or 6 disc friction surfaces. Convenient adjustments can be made to compensate for lining wear. The compact unit

ROEBLING WIRE, in Convenient Bulk, packaged to save you money, time and labor

If you use high-carbon wire in sizes from .060" diam. to .030" diam., it will pay you to investigate Roebling's Reel-less Core Packaging System. This method offers you substantial savings in several ways—to say nothing of the quality wire that Roebling always delivers in any kind of package.

Here's how simple it is:
Cores are palletized two cores per pallet and can be stacked two or three pallets high (think of the saving in storage space).

Empty reels are not accumulated because there are no reels to store, send back, bookkeep, get credit on, or pay shipping charges on (either way). Just unwrap the wire, set it up the way you see here, and there you are. Where a limited number of reel-less core packages are used, or where wire is flipped from reels mounted in a horizontal position, the tilt table is not necessary.

This method is typical, indeed, of Roebling's efforts to make quality easier to handle and to banish the problems that cost you time, money and sharp pains across the brow.

Full details of wire without reels will be immediately forthcoming when you write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

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COATED IRON PIPES AND FITTINGS PROTECT YOUR PRODUCTS

Many industries rely on HERESITE PURE PHENOL-FORMALDEHYDE resin lining in steel pipes and steel pipe fittings to control corrosion and commodity contamination.

Since 1942 the oil industry has used millions of feet of pipe which were lined with HERESITE to reduce corrosion fatigue.

Catalog No. 60 will be mailed if requested on your letterhead.

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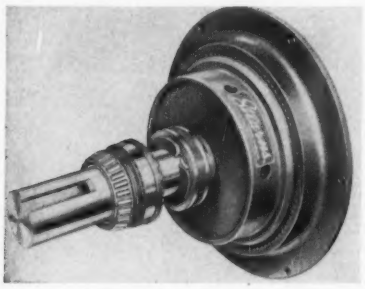
Canada: Dominion Rubber Company, Ltd.
Montreal, Quebec

Europe: Aluminium-Schweisswerk A. G.
Schlieren-Zurich, Switzerland

NEW PRODUCTS and equipment



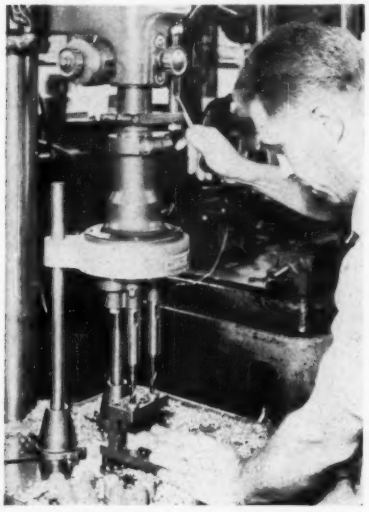
is suited for use where space between drive and driven members is at a premium. Sizes include 7, 9, 13, and 15 in. diameters with torque ratings up to 4000 ft-lb.

For further information, *write* Stearns Electric Corp., 120 North Broadway, Milwaukee 2, Wis.

Drill Head Available With 2, 3, or 4 Spindles

AN ADJUSTABLE, multiple spindle, drill head handles drills through 5/8 in. in steel. The unit (Model 600) can be quickly attached to any drill press and its adjustable spindles permit drilling or tapping a wide variety of hole patterns on a 6 1/4 in. diameter circle. It's available in 2, 3, or 4 spindle versions.

Built-in speed reduction permits its use on smaller drill presses for large diameter multiple hole drilling or tapping. Accessory guide rods provide maximum vertical travel stability. The head comes with a



Commander motor reversing unit.

For further information, *write* Commander Mfg. Co., 4225 W. Kinzie St., Chicago, Ill.

High Volume Canned Pump Doesn't Require Seals

A LOW head, high volume pump (1/6 to 3/4 hp) is said to be leakproof, noiseless, and vibrationless. It measures 8 3/4 x 8 1/4 in. and weighs about 33 lb.

It's made in stainless steels, Hastelloy-B or C, bronze, Type C #20, cast iron, or Monel. The line

is supported in any position. The one moving part (the rotor-impeller) is directly driven by currents generated by the stator in the center of the electric motor.

There are only two friction points, the front and rear bearings which are lubricated by the liquid being pumped. No seals or packing are necessary.

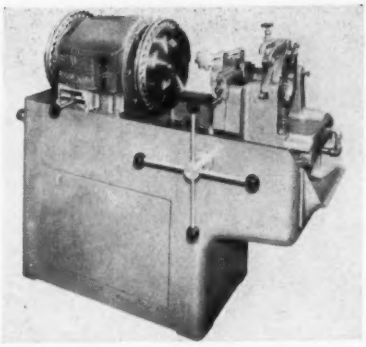
For further information, *write* Corley Co. Inc., Boonton, N. J.

4 in. Pipe and Bolt Unit Suited for Makeup Work

THE Speed King pipe and bolt machine can be used for makeup. It has wrenchless chucks, four speeds, and throwout fixtures.

The unit (980 lb) can be trailer mounted. You can choose a wheel and roller or knife type cutoff. The machine can also be used for grooving for couplers, beveling for welding, or cutting and stripping Saran.

It can thread 1 through 4 in. pipe using only two die heads and two sets of dies. The unit has a



quadra-type die head. The entire range of 2 1/2 through 4 in. can be threaded without changing dies or die heads.

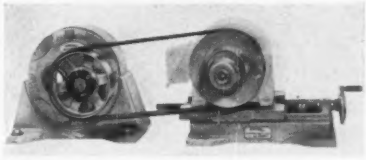
For further information, *write* Beaver Pipe Tools Inc., Warren, Ohio.

Variable Speed Reducer Has Standard Components

THE Optimount variable speed Reductor drive is designed for 3/4, 1, 1 1/2, 2, and 3 hp motors.

Driven shaft speeds are provided in various 3 to 1 infinitely variable speed ranges between 431 and 24 rpm.

The drive combines pulley (Boston Gear, standard, variable speed), belt, and adjustable motor base with a



standard, shaft mounted—or horizontal, base mounted—Optimount, helical geared Reductor.

For further information, *write* Boston Gear Works, Quincy 71, Mass.

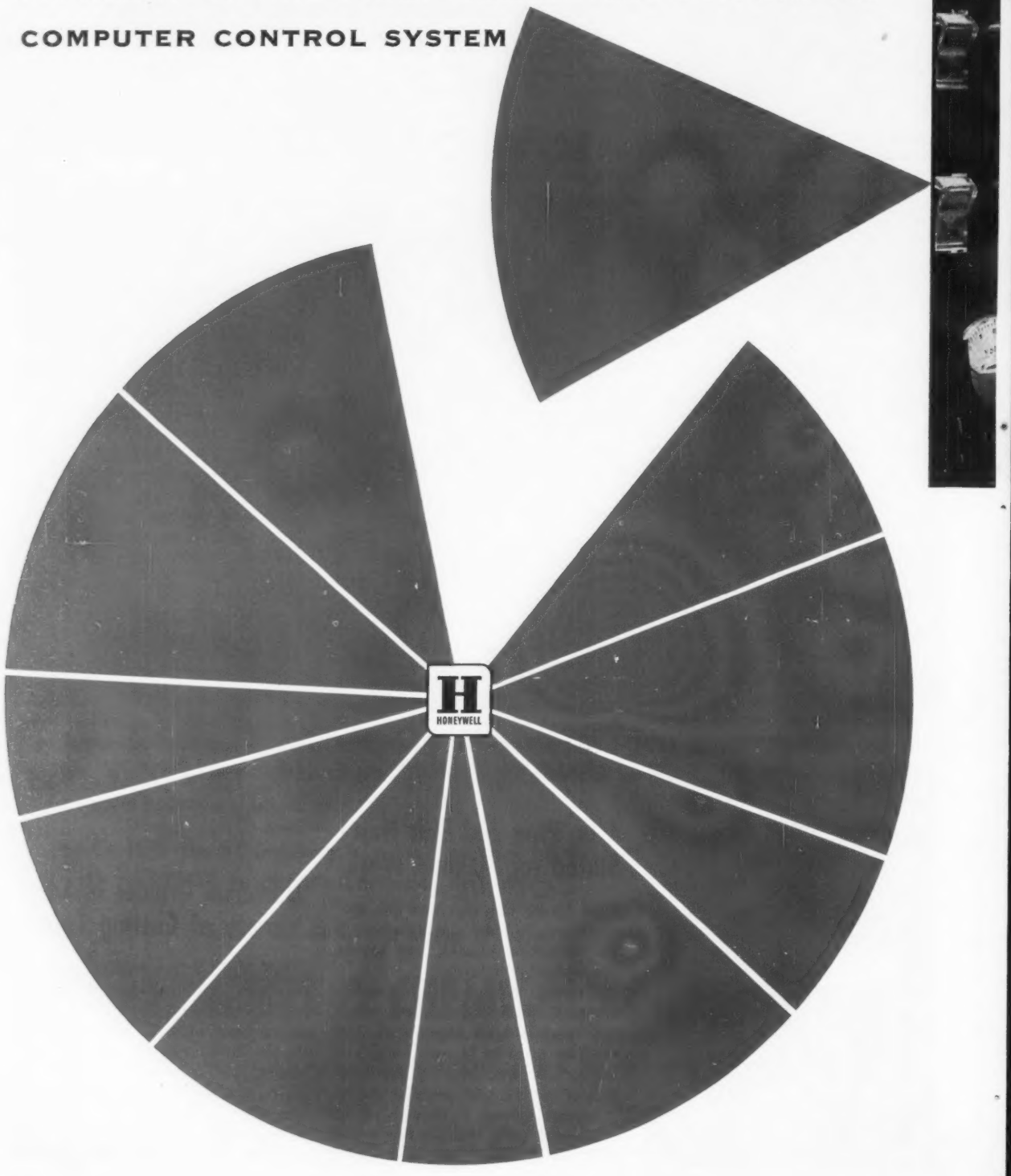
Universal Grinder Handles Variety of Cutting Tools

THE Multi-Spiral universal grinder can easily and quickly grind a wide variety of cutting tools. The unit is designed to make end mills, step drills, drills, reamers, and counterbores, plus all end cutting tools, spiral or straight fluted, ground from the solid.

Specifications: Spindle capacity, 1 1/4 in. hole 5 3/4 in. deep; spindle

NEW HONEYWELL 290 INDUSTRIAL DIGITAL COMPUTER

. . . HEART OF THE FIRST COMPLETELY INTEGRATED COMPUTER CONTROL SYSTEM



Single-Source Responsibility. Now you can get the first truly complete computer control package produced by a single manufacturer. The new, all-solid-state Honeywell 290 Industrial Digital Computer rounds out Honeywell's broad line of instrumentation, and enables you to specify an all-Honeywell process control system. That means you're protected by single-source responsibility . . . from primary elements to final controls, from initial concept through maintenance.

High Speed plus Reliability. This new computer is the most powerful in its field. Typical operation rates: 8,000 additions, 1,250 multiplications, or 400 square root extractions per second. This high-speed computing of currently pertinent data gives you precise process control. Simplified programming adapts the computer easily to process changes. All-solid-state design and extensive system self-checks are engineered into every circuit and every unit of the computer.

Application Experience plus Computer Know-How. With the addition of the Honeywell 290 computer to the world's most extensive line of measuring and control equipment, Honeywell systems engineers now have the tools to implement all applications including those requiring computer control.

Take advantage of Honeywell's 75 years of experience in industrial process control. Get the advantage of having your entire system under Honeywell's overall responsibility.

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75th YEAR PIONEERING THE FUTURE

Honeywell

First in Control

SINCE 1885

WHY MICROHONING* of Accumulator Bores provides processing short cut

American Bosch Division of American Bosch Arma Corporation has recently added hydraulic cranking systems and a wide variety of hydraulic accumulators to their extensive line of precision equipment. Microhoning is specified as the only machining operation performed in the bores of the accumulator housings—here is why.

This horizontal Hydrohoner has a hydraulically reciprocated carriage, a ten-foot stroke and a four-speed transmission.

PROCESSING ECONOMY

The accumulator housings are made from mill stock tubing that is mostly either cold rolled welded or cold drawn seamless steel (some of the 4.750″ I.D. tubing is aluminum alloy). Economical processing of tube bores is realized through the inherent efficiency of Microhoning in generating geometry, size and surface finish. Microhoning is the only machining done on bores ranging in diameter from 3.000″ to 6.180″ and in lengths from 6.375″ to 123″.

RAPID STOCK REMOVAL

Accumulator bores are rough—and finished—Microhoned on the horizontal Hydrohoner shown. It is designed to provide rapid stock removal and generate accuracy in long bores. Rough-Microhoning of the mill stock tubing bores removes up to .040″ of stock at a rate of better than .001″ per minute. Finish-Microhoning removes .004″ of stock while generating final accuracies and specified surface finishes.

FUNCTIONAL BORES

In addition to consistent bores that are well within specified size and geometry tolerances, Microhoning provides controlled surface finishes of 7-8 microinches, rms. The Microhoned surfaces are so consistent that a check on a precision surface analyzer is made only two or three times per eight-hour shift. Microhoned bores assure smoother operation and longer life for piston seals in assembled accumulators.

**Registered U. S. Pat. Off.*

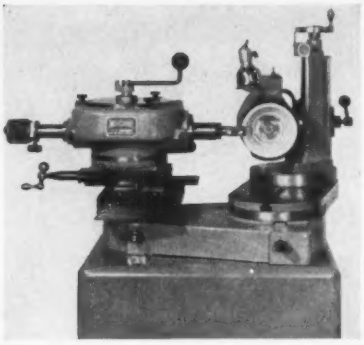
Visit Us In Booth 1225 — The Machine Tool Exposition

PRECISION PRODUCTION THROUGH MICROHONING — MICRO MATIC

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

NEW PRODUCTS and equipment

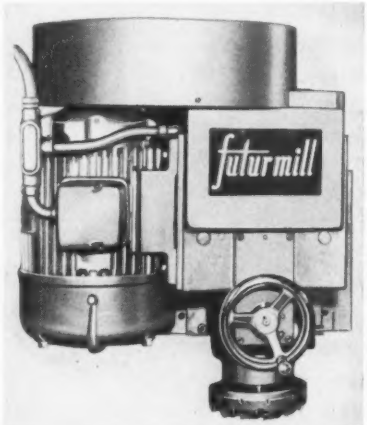


stroke, 3¾ in.; index spool for 2-3-4-6 divisions; and a ½ hp, 115 volt, 60 cycle motor (3450 rpm) and friction brake.

For further information, *write* Spiral Step Tool Co., 5400 N. Damen Ave., Chicago 25, Ill.

Milling Spindle Converts Planers, Old Machines

A LIGHTWEIGHT, adjustable speed, milling spindle is designed for converting planers and older machines to rapid metal removal units. The spindle (Model AS—10 to 25 hp) has an adjustable speed range from 125 to 1100 rpm. The spindle is mounted in roller bearings.



A geared, changeable, timing belt is used as a spindle drive. It has a 6 in. quill adjustment and weighs less than 1200 lb in the 10 and 15 hp models.

For further information, *write* Futurmill Inc., 6360 Highland Rd., Pontiac, Mich.

NEW literature

Write directly to the company for a copy

1960 Scrap Yearbook

Statistical material relating to the use of iron and steel scrap during 1959 makes the 1960 Scrap Yearbook a handy reference work. Subject matter includes analysis of scrap sales and the current market; scrapyard processing; scrap sources; exports; and a price study. Specifications for iron and steel scrap are also included. Institute of Scrap Iron & Steel Inc., 1729 H St. N.W., Washington 6, D. C.

Palletless Handling

Palletless handling is discussed in an 8 page brochure. It discusses the advantages of palletization and the advantages of the palletless handling system. Automatic Transportation Co., 149 W. 87th St., Chicago 21, Ill.

Commodity Standards

An index lists all commercial standards under 22 classifications. New standards in preparation and existing standards being revised to reflect current industry practices are shown in a supplemental list. Also available is a pamphlet, "Commodity Standards, What They Are—How They Are Done—Why They Are Used." Ask for Catalog No. 978 and Commodity Standards Pamphlet. Commodity Standards Division, U. S. Department of Commerce, Washington 25, D. C.

Wire, Rod, Strip Catalog

Complete data on properties of Techalloy alloys are presented. Also included are federal, military, ASME, and ASTM specifications. The catalog lists the recently released ASM specifications on Monel, nickel, Inconel, Inconel X, and ASM specification numbers. Specify Price Schedule No. 14. Techalloy Co. Inc., Rahns, Pa.

Factory Water Problems

Water problems from pretreatment to waste disposal are described in a 24 page brochure. It emphasizes the role of proper water management to obtain lowest water costs. A bibliography outlines more than 100 papers written by Hall engineers. Hall Laboratories Div., Hagan Chemicals & Controls Inc., Hagan Center, Pittsburgh 30, Pa.

NEW BOOK

Light Metals and Alloys, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 368 pages, $4.50 The book contains 57 standards, 15 of which are revised or have had their status changed since the previous edition. Three new standards are included. One is for aluminum alloy pipe for gas and oil transmission. Included also are a new specification for aluminum coated steel wire for electrical transmission and a new test method for electrical conductivity using eddy current procedures.

HOW MICROHONING of Accumulator Bores provides processing short cut

Fast, economical generating of specified bore size, geometry and surface finish in accumulator housings is required by American Bosch Division of American Bosch Arma Corporation. Housings are made from mill stock tubing and Microhoning is specified as the most suitable process to consistently and quickly generate precision bores. Here is how a horizontal Hydrohoner provides a processing short cut.

The flange-type tool used to Microhone the 6.180" I.D. tubing has 8" long stones and four fibre guides. These stationary guides pilot the tool into the bore and prevent "collapsed" abrasives from marking precision bore surfaces when withdrawing the tool.

SIMPLIFIED PROCESSING

Because Microhoning characteristics include: rapid stock removal; consistent machining to specified size; correction of geometric irregularities; and generation of microinch finishes, there is no need for any other machining operation. Rough-Microhoning of the bores removes up to .040" stock at a rate better than .001" per minute. Then the finish-Microhoning operation quickly generates final size, geometry and surface finish. Thus, processing is simple, quick and economical.

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Gage Air Microsize is used to automatically terminate the Microhoning cycle as each bore reaches specified size. Microsize controls are interlocked with Hydrohoner controls, and the reciprocating gage spindle is synchronized with the tool spindle. Therefore, at each withdraw stroke of the tool, the gage spindle attempts to enter the bore. When it enters the bore, the air back-pressure is increased and at a predetermined back-pressure the Hydrohoner is automatically stopped.

HIGH EFFICIENCY

Another factor contributing to the high efficiency of this Microhoning set-up is the electric rotary feed tool. This design provides constant feed speed and maximum cutting action. Also, with rapid expansion and "collapse" of abrasives, it assures shorter cycle time than obtainable with conventional hydraulic feed mechanisms.

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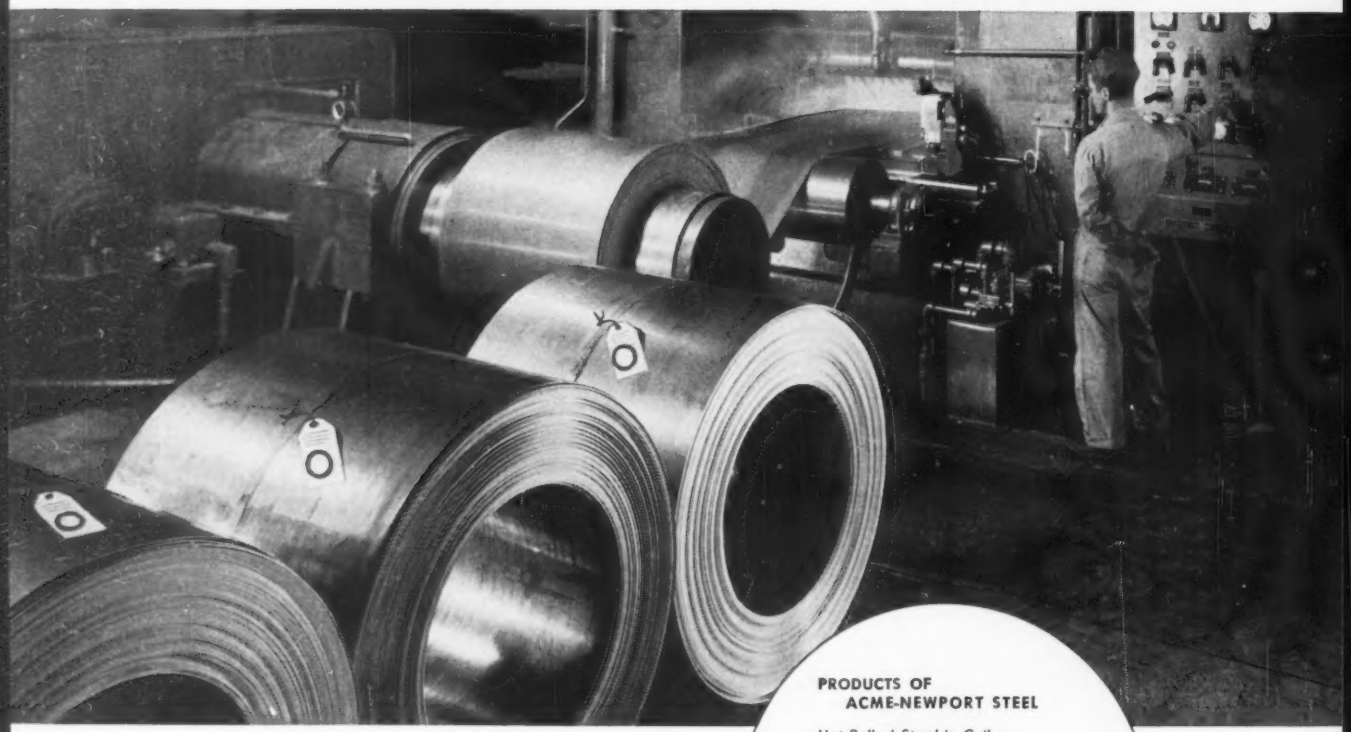

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Foreign Trade in Steel Shifts

LOOK for U. S. mills to narrow the gap between steel exports and imports.

Latest figures released by the Department of Commerce show a dramatic reversal of the import tide that was running so strongly against U. S. steelmakers during the first quarter. In June, exports jumped to 382,000 tons—the largest volume of any month since October, 1957. Imports dropped to 213,000 tons—lowest since November, 1958.

Although imports topped exports by 750,000 tons in the first half—2,216,000 tons to 1,466,000—the deficit is not so large that it can't be whittled down in the remaining months of the year. Some market analysts expect imports to average 250,000 tons a month for the rest of the year. If they do, the year's total will be about 3.7 million tons—700,000 tons less than came into this country in 1959.

Exports may not stay as high as they were in June—when shipments probably included orders accumulated in several prior months—but they could average 300,000 tons a month for the rest of the year. If they do, the year's total will be 3.3 million tons—nearly twice the 1959 volume.

NO FURTHER DECLINE— Imports won't drop unless there's a recession and general reduction in demand for steel products. The shakeout is over. U. S. consumers won't pay premium prices for foreignmade sheets as they did at the turn of the year, but they'll continue to buy the products they can get at lower prices: Barbed wire, nails, fencing, wire rods, reinforcing bars, and standard pipe. For producers of merchant wire and other items on which quality requirements aren't rigid, competition from foreign mills will remain a vexing problem.

SLOWNESS PERSISTS—Although many steel consumers have completed their inventory adjustments, there's no evidence of an upturn in demand. Incoming orders are fluctuating inconclusively—up one week and down the next. Sales executives have no more tonnage on their books for September than they had a month ago for August. At one big mill, hopes for better business got a rude jolt when a customer canceled plans for a pipeline project. Steelmakers still believe that September bookings will be 10 per cent better than August's, but they realize that they may not have the orders to support their prediction until they're well into the month of shipment.

SERVICE CENTERS HOPEFUL— At steel service centers, business has been slow because of plant vacations, but it's believed that shipments have bottomed out. Industry leaders hope that August sales will be 5 to 10 per cent larger than last month's. With many mills promising delivery of flat rolled products in less than two weeks, service centers report a drop in average order size.

FOURTH BEST SHIPMENTS—June shipments of finished steel products (5.9 million tons) brought the first half's total to 42.8 million, fourth largest in history for that period. In last year's strike threatened first half, shipments were 5.3 million tons larger. The big losses this year have been in pipe and tubing (1.7 million tons), electrolytic tin plate (545,000 tons), hot rolled sheets (542,000), hot rolled bars (500,000), drawn wire (466,000), and reinforcing bars (400,000). Among the few products that have fared slightly better this year are heavy structural shapes, standard rails, and railroad wheels.

OUTPUT EDGES UPWARD— Last week, steelmaking operations advanced 0.7 of a percentage point to 54.6 per cent of capacity. Production was about 1,556,000 ingot tons.

WHERE TO FIND MARKETS & PRICES

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*Current prices were published in the Aug. 8 issue and will appear in subsequent issues.

Alabama Metallurgical Corp., Selma, Ala.: High-purity magnesium ingots ready for shipment; ALAMET also produces commercial and alloy grades.

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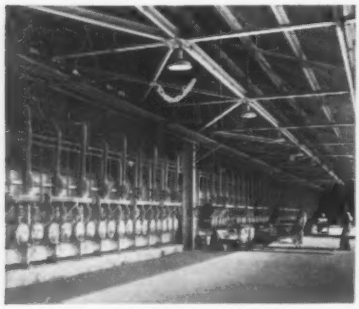

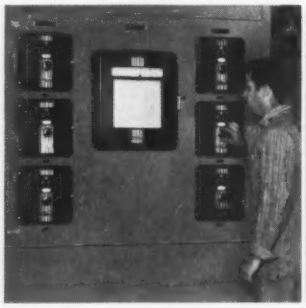

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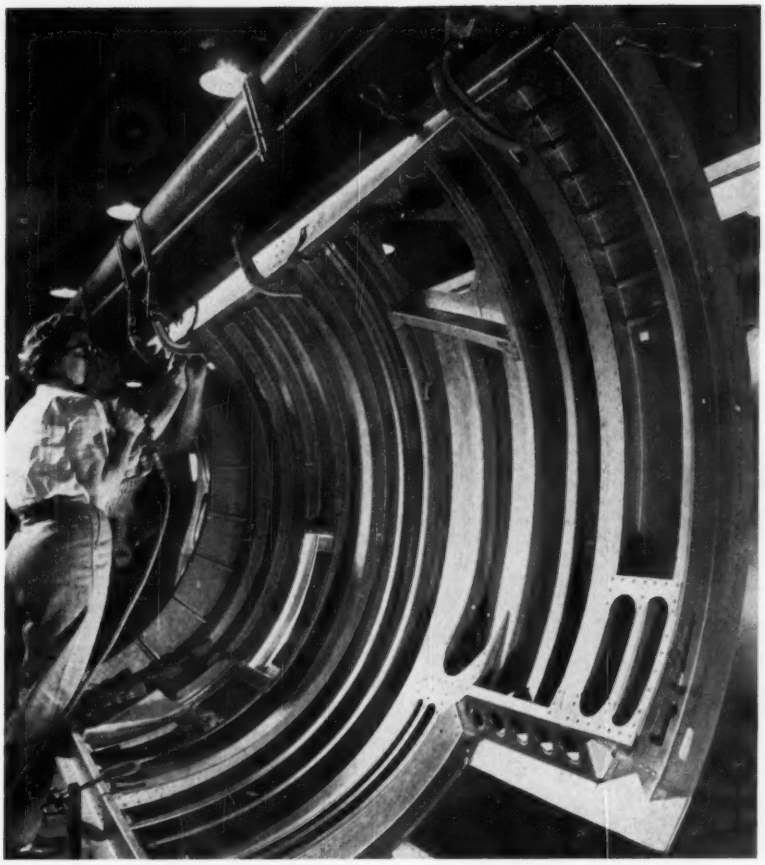
Instruments Automatic Controls • Furnaces

With Electromax holding retort temperatures within ± 5 F, Speedomax G multiple-point recorders provide a permanent record of furnace temperatures.



One promising titanium market is in civilian jet aircraft. This access panel, which covers the engine of the DC-8, measures 102 in. by 76 in. and weighs 80 lb. About 600 lb of titanium are used in DC-8 pods and pylons

Titanium Sales Perk Up

COMMERCIAL markets for titanium are opening up. In the first five months of this year, shipments of mill products totaled 3,284,721 lb, almost 67,000 lb ahead of the year-ago total.

• **Long Way to Go**—While that's a far cry from the peak years of 1956-57 (see graph, right), it is a good deal better than most market observers forecast earlier this year. The government pegged 1960 demand at about 15 per cent below the 1959 level, and many producers of the light, tough metal still feel that declining military requirements will take their toll during the rest of the year. But a combination of new uses and a touchy international situation will minimize the decline. Full recovery, they say, will take several years of intense research and marketing effort.

The main problem has been the transition from manned military aircraft (which accounts for between 65 and 80 per cent of total usage) to missiles and rockets (which account for less than 5 per cent).

"Current applications of titanium products in missiles have been for the most part experimental," says a spokesman for Republic Steel Corp. "We anticipate that several of the programs will be highly successful and that the resulting increased demand will to some extent offset the current depressed market."

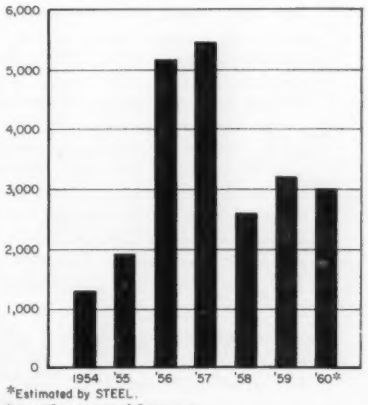
On the other hand, Tom W. Lippert, director of marketing, Titanium Metals Corp. of America, says: "This year finds titanium in a strict development market, with more and more people buying less and less for prototype and test construction. If any of the programs move into production, the effect on titanium could be quite good. However, our experience has been that sometimes two years elapse before production begins."

• **Commercial Markets Opening**—Several good civilian markets are beginning to develop. One of the most important is in the chemical processing industry, where corrosion resistance is a critical factor. Stock parts, such as valves and pipe fittings, are being supplied by an increasing number of companies, says the Union Carbide Metals Co., a division of Union Carbide Corp. Corrosion resistance is also leading to markets in ore processing and pulp and paper plants, marine hardware, and industrial applications in marine atmospheres.

Some titanium is going into dynamically stressed parts. It is reported that several racing cars in the Indianapolis "500" used some titanium parts. Manufacturers of printing presses and other high

Doing Better Than Expected

(Mill product shipments, net tons)



*Estimated by STEEL.
Source: Department of Commerce.

speed equipment are also studying applications.

Major progress in fabrication has been made in powder metallurgy, Union Carbide declares. The technique offers high volume production, close tolerances, and a minimum of secondary machining. It is being applied to corrosion resistant parts such as valve seats and discs.

George J. Wile, metallurgical engineer at General Electric Co.'s Jet Engine Dept., Evendale, Ohio, sees expanding applications in jet aircraft. He reports that its use for rotor blades, stator vanes, rotor discs and spacers, shafting and sheet metal components results in vitally needed weight reductions. In the J57 engine, as much as 443 lb were saved by using titanium. From a cost viewpoint, he believes it is among the least expensive materials used in jet engines.

• **Military Still Tops**—But defense applications still account for the lion's share of mill product shipments. A reappraisal of the B-70 program—in view of heightened world tensions—could lead to increased requirements. And a new application in the Davy Crockett nuclear gun could amount to about 2 million lb in the next five years.

One of the most spectacular potentials is in submarine construction. One industry official says there has been serious discussion about using titanium for hull plates. But two of the biggest drawbacks are joining and heat treatment. It is understood that the industry is researching both problems. The Polaris missile has several important applications—and this market should improve soon because the missile has passed all tests.

• **Favorable Price Trend**—Brightening the outlook is the gradual reduction in prices over the last six years. The price of sponge has dropped 68 per cent since 1954, and the TMCA price composite on mill products has plunged 54 per cent. Improvements in scrap utilization and better production techniques generally have contributed much to the lowering of prices. One producer feels that "there is little likelihood of any further major price reductions this year, or in the near future, unless there is some major breakthrough to permit substantially lower production costs."

But industry officials feel that in many applications, their metal is competitive at today's prices. Considering its strength to weight ratio in particular, the metal is not unduly expensive. Says M. J. Day, vice president-commercial, Crucible Steel Co. of America: "On a beta alloy of titanium, the ratio is the highest of any material available."

One producer also says that if increased service life and installation expenses are taken into account, titanium equipment often winds up costing less than that made with materials priced much lower per pound.

Steel Bars . . .

Bar Prices, Page 124

While diversified, demand for hot carbon bars lags badly. However, inventories are becoming increasingly out of balance and will have

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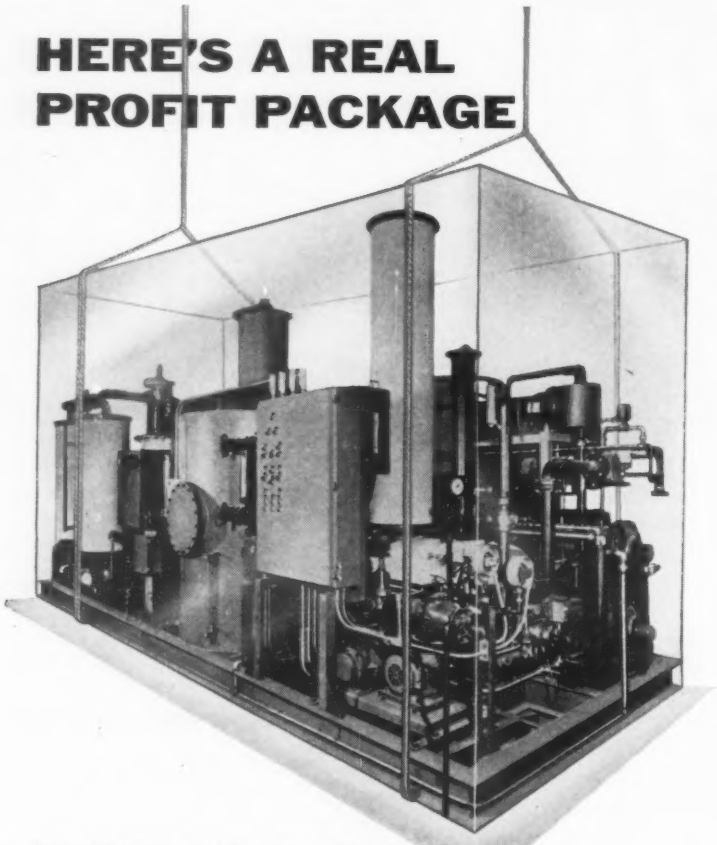

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to be given greater attention as soon as fabrication picks up.

Delivery promises range one to four weeks on hot carbon and two to five weeks on hot alloys. Sellers of cold drawn carbon bars have substantial stocks of hot bars on hand and, accordingly, can often offer deliveries within a week. Where hot stock in the required specifications isn't on hand, deliveries average around three weeks. In general, cold drawn alloys are available in four to six weeks.

Atlantic Steel Co., Atlanta, has revised size extras on hot rolled carbon steel bars, merchant and special qualities, for rounds, squares, and round cornered squares, to the following levels per hundredweight: ¼ in., $2.50; 9/32 in., $2.20; 5/16 in., $2; and 11/32 in., $1.70.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 125

Sheffield Div., Armco Steel Corp., Kansas City, Mo., reduced prices on reinforcing bars 25 points to 5.675 cents to fabricators and 7.35 cents, fabricated, to consumers. They are mill prices at Kansas City, Houston, and Sand Springs, Okla.

Officials explain the cut was made to bring Sheffield's price into line with established prices in its major markets outside of the districts where it has plants. Sheffield was previously forced to absorb some freight charges into such neutral areas as Iowa, Nebraska, and Minnesota in which the division competes with mills shipping from Chicago and Birmingham. Sheffield now will reduce its transportation charge absorption, leaving the prices to these customers, in effect, unchanged. The firm's customers in cities where Sheffield has plants will benefit from the reduction.

Plates . . .

Plate Prices, Page 124

Plate producers foresee no immediate improvement. Shipwork, railroad requirements, line pipe, and tank fabrication lack early promise. Heavy building construction and defense work appear a little more encouraging. A pickup in orders is expected to develop as the fourth quarter progresses.

Demand is mounting gradually for liquid oxygen plant installations, including tanks. In New England, three large nuclear submarines will be built (two at Groton, Conn., and one at Portsmouth. N. H.).

Other work includes several modified offshore "Texas towers." The Coast Guard, Buzzards Bay, Mass., and Brenton Reef beacon, Newport, R. I., will use them to replace lightships.

Deliveries of sheared plates range from ten days to three weeks; universal plates, about two weeks; and alloy plates around five weeks.

One Eastern plate mill plans to suspend operations for a week beginning Aug. 22.

Wire . . .

Wire Prices, Pages 126 & 129

Demand for heavier gages of carbon wire required for construction projects, notably prestressed strand, is steady, but total volume for the first eight months is 10 per cent under that for the like period a year ago. Inventory orders were substantially heavier during the first half of last year.

All grades of steel wire can be shipped promptly and leadtimes for most specialties are shorter. Order backlogs at mills are low, but con-

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sumer inventories of finished wire are not as heavy as those of many finished steel products. A moderate increase in buying is expected during the fourth quarter.

On the other hand, stocks of wire rods are larger in most instances. Fastener manufacturers are not buying in volume and their business is spotty with prices under pressure from competition.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 125 & 126

Demand for sheets and strip is improving, principally for September delivery when consumption is expected to increase. The development will probably be accompanied by a tightening in consumers' inventories.

While consumers' stocks generally are fairly good in volume, there is an increasing lack of balance, as revealed in the increase in small rush orders for certain types and sizes. When consumption increases and deliveries become more extended, greater attention will be centered on the replenishment of inventories. The move may come in September when a substantial improvement in automotive and other durable goods requirements is expected.

Cold rolled sheets can be had within two to three weeks where bands are available and around five weeks where they are not. Hot rolled sheets are being offered within one to two weeks, where producers have bands on hand; two to three weeks where they haven't. Enameling stock and electrical sheets can be had within a month; stainless sheets, within three to four weeks.

Demand for heavy gage, asphalt coated, corrugated galvanized sheets is heavier in New England for highway drainage and short bridge structures. The product has moved well since spring, and more tonnage is being placed for installation before the frost season.

Strip specialties also are fairly active in that area, but carbon sheet users still depend largely on inventory or small spot shipments.

Iron Ore . . .

Iron Ore Prices, Page 132

Stocks of iron ore in the U. S. and Canada at the end of June, 1960, totaled 53,735,371 tons compared with 49,878,688 tons at the end of June, 1959, reports the American Iron Ore Association.

Consumption in the second quarter, 1960, amounted to 29,916,355 tons, bringing the total for the first six months of this year to 66,642,148 tons. Consumption in the first half of 1959 totaled 68,768,410 tons. Total receipts in the second quarter, 1960, came to 42,576,105 tons against 41,643,521 tons in the like period a year ago; for the first half, 1960, 56,304,326 tons against 51,690,737 tons.

Lake Superior iron ore shipments from U. S. and Canadian ports totaled 12,065,190 tons in July, an increase of 5,209,833 tons over the total for the like month a year ago. This brought the season's total to Aug. 1 to 42,265,773 tons, an increase of 6,666,383 tons over the total for the like 1959 period.

Finished Steel Shipments From Mills Hold Up Well

Shipments of finished steel products direct from mills totaled 42,853,937 net tons in the first six months of this year, reports the American Iron & Steel Institute. The first half total has been exceeded only three times: By the record 48.2 million tons shipped in the first half of last year and by totals for the January-June periods in 1956 and 1957.

June shipments totaled 5,920,860 tons against 6.3 million tons in May, and 9.7 million tons in the all-time record month of June, 1959.

Principal products shipped from mills in the first six months were:

Products	6 Mo., 1960	% of Total	6 Mo., 1959	% of Total
CR Sheets	8,700,278	20.3	8,847,498	18.4
HR Sheets	4,944,450	11.5	5,485,862	11.4
HR Bars, including light shapes	4,305,354	10.1	4,808,620	10.0
Plates	3,870,951	9.0	3,989,948	8.3
Tin Plate, Electrolytic	2,964,818	6.9	3,510,124	7.3
Heavy Structural Shapes	2,947,992	6.9	2,929,699	6.1

Market classifications receiving the principal amounts of finished steel products in the first six months were:

Markets	6 Mo., 1960	% of Domestic Shipments	6 Mo., 1959	% of Domestic Shipments
Automotive	8,602,882	20.8	9,951,879	21.1
Service Centers & Distributors	7,727,046	18.6	8,867,767	18.8
Construction (including maintenance)	5,583,713	13.5	6,188,611	13.2
Containers	3,853,013	9.3	4,533,634	9.6
Machinery, Industrial Equipment & Tools	2,538,590	6.1	2,895,522	6.2

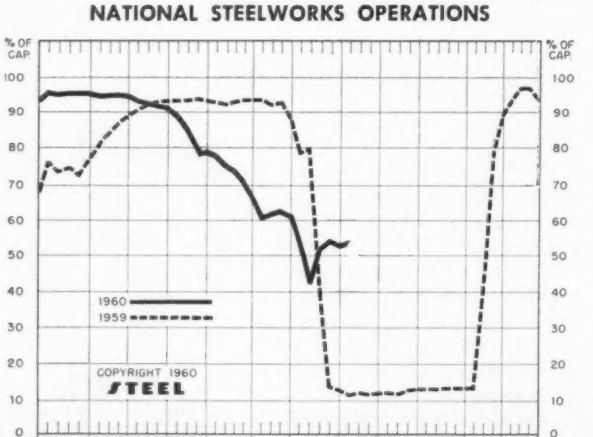
DISTRICT INGOT RATES

(Percentage of capacity utilized)

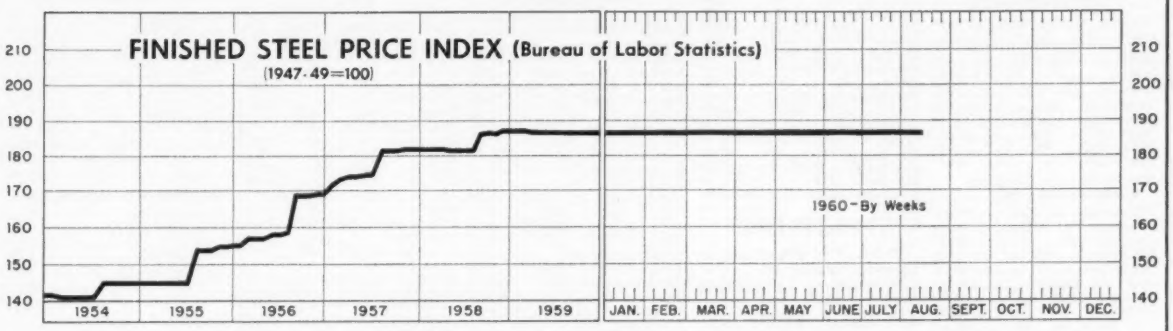
	Week Ended Aug. 14	Week Ago	Month Ago	Year Ago
Northeastern	59	58	57	*
Buffalo	56	56	52	*
Pittsburgh	50	49	44	*
Youngstown	47	47	35	*
Cleveland	51	46	46	*
Detroit	80	78	82	*
Chicago	57	56	58	*
Cincinnati	58	55	43	*
St. Louis	58	54	52	*
Southern	55	61	65	*
Western	46	48	55	*
Total Industry	54.6	53.9	51.8	11.8
Index (1947-49=100)	96.9	95.7	91.9	20.9
Net Tons (In thousands)	1,556	1,537	1,476	335

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute. *Not available due to general strike.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Aug 9, 1960	Week Ago	Month Ago	July Index	Year Ago
186.2	186.2	186.2	186.2	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Aug. 9

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, Reinforcing	6.335
Rails, Light, 40 lb	7.292	Bars, C.F., Carbon	10.710
Tie Plates	6.875	Bars, C.F., Alloy	14.125
Axles, Railway	10.175	Bars, C.F., Stainless, 302 (lb)	0.570
Wheels, Freight Car, 33 in. (per wheel)	62.000	Sheets, H.R., Carbon	6.350
Plates, Carbon	6.350	Sheets, C.R., Carbon	7.300
Structural Shapes	6.167	Sheets, Galvanized	8.775
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Strip, C.R., Carbon	9.489
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Alloy	10.775	Strip, H.R., Carbon	6.250
Bars, H.R., Stainless, 303 (lb)	0.543	Pipe, Black, Buttweld (100 ft)	19.495
Bars, H.R., Carbon	6.675	Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	195.395
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.414
		Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED PRICE INDEX*

	Aug. 10 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	207.63
Index in cents per lb	6.713	6.713	6.713	6.713	5.625

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$127.41
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	32.00	32.00	31.67	38.33	44.17

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Aug. 10 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.50
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.50
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.317
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35-6.45
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 7/32-½" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton

	Aug. 10 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	56.16
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	59.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$30.50	$30.50	$30.50	$38.50	$44.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	40.00	46.00
No. 1 Heavy Melt, Chicago	31.50	31.50	30.50	36.50	42.00
No. 1 Heavy Melt, Valley	33.50	33.50	32.50	41.50	46.50
No. 1 Heavy Melt, Cleve.	31.50	31.50	31.50	38.50	44.00
No. 1 Heavy Melt, Buffalo	29.50	29.50	29.50	33.50	39.50
Rails, Rerolling, Chicago	53.50	52.50	49.50	59.50	64.50
No. 1 Cast, Chicago	42.50	42.50	40.50	53.50	45.50

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

Steel Prices

Mill prices as reported to STEEL, Aug. 10, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 125; footnotes, page 129.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3..104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 ....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14.99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ....119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ..119.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14 122.50
S.Duquesne,Pa. U5 ....122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ...7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W. Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 .5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 .....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 .....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (Including loaded extra)
Carbon
LosAngeles P2, S30 ..11.75*
Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2..7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. B5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025

Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.426
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.25
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ...5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ....5.675
Seattle A24, B3, N14..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 .....7.35
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ....7.35
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ....7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ...5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ...5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.06

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ....7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ....6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 .....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ...7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvanized Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3.....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forging Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M22	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Cleveland A7	15.55
Carnegie,Pa. S18	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. N8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.10	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.10	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria,O. S1	...	...	19.05	22.15	....
FranklinPark,Ill. T6	...	...	19.20	23.30	28.15
Harrison,N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer,Mass. W12	...	...	18.85	....	....
Trenton,N.J. R5	...	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M22	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	....	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	....	7.90	....	....
Niles,O. R2 (20-27 Ga.)	....	7.90	8.10	8.30

TIN PLATE,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$10.05
Irvin,Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift,Pa. U5	8.10
Mansfield,O. E6	8.10
Warren,O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths) Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
Rankin,Pa. A7	8.00
S. Chicago,Ill. R2	8.00
S.SanFancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	13.40
KansasCity,Mo. U3	12.90
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Munice,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling, N. J. R5	12.95
SparrowsPt. Md. B2	13.50
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Millbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Munice,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

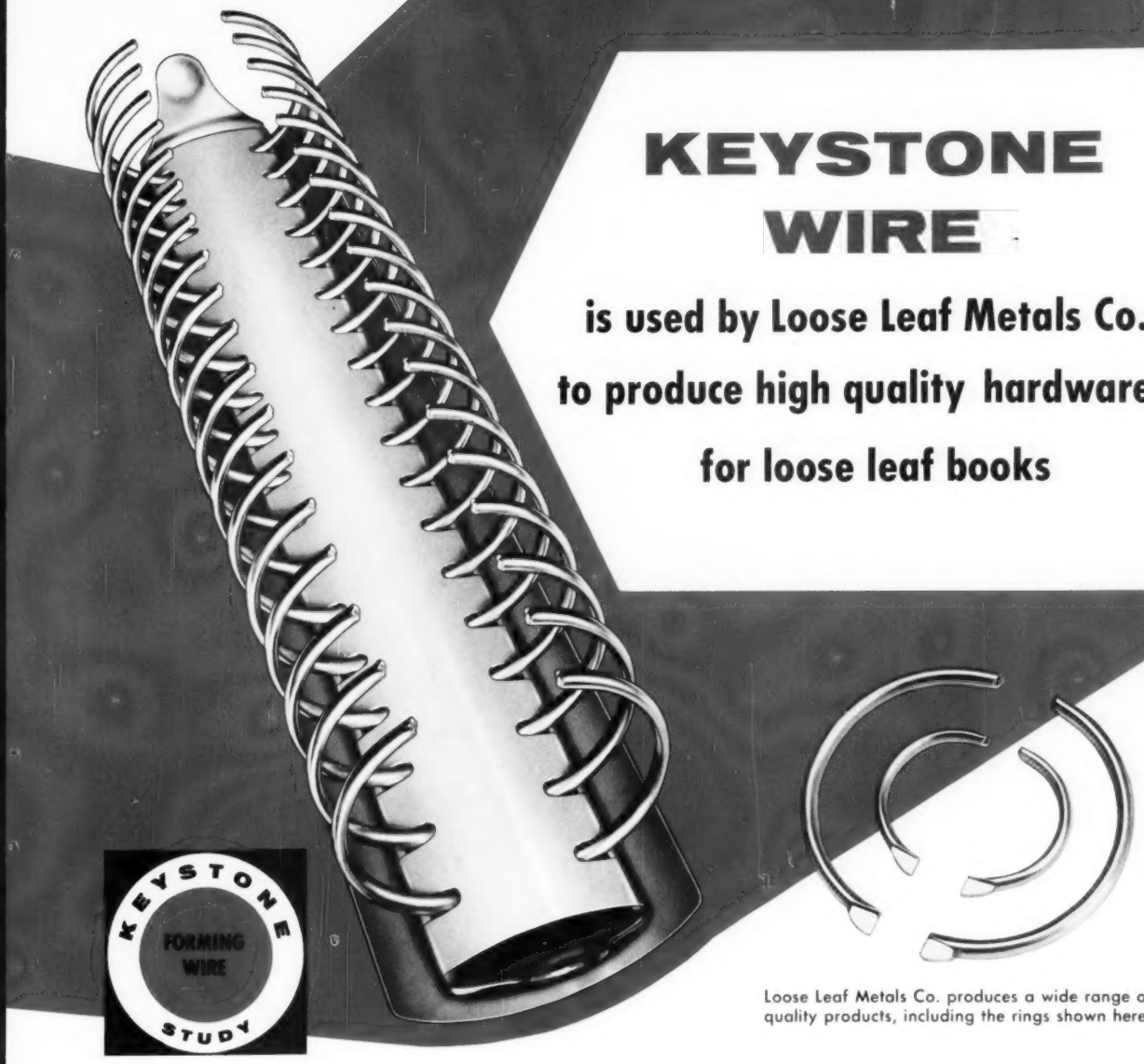
ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
Johnstown,Pa. B2	13.45
KansasCity,Mo. U3	13.70
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

KEYSTONE WIRE

is used by Loose Leaf Metals Co. to produce high quality hardware for loose leaf books



Loose Leaf Metals Co. produces a wide range of quality products, including the rings shown here.

Manufacturers of loose leaf binders look to Loose Leaf Metals Co. for their hardware needs. And, in turn, Loose Leaf Metals looks to Keystone for forming wire that has all the necessary properties for quality manufacture of their rings.

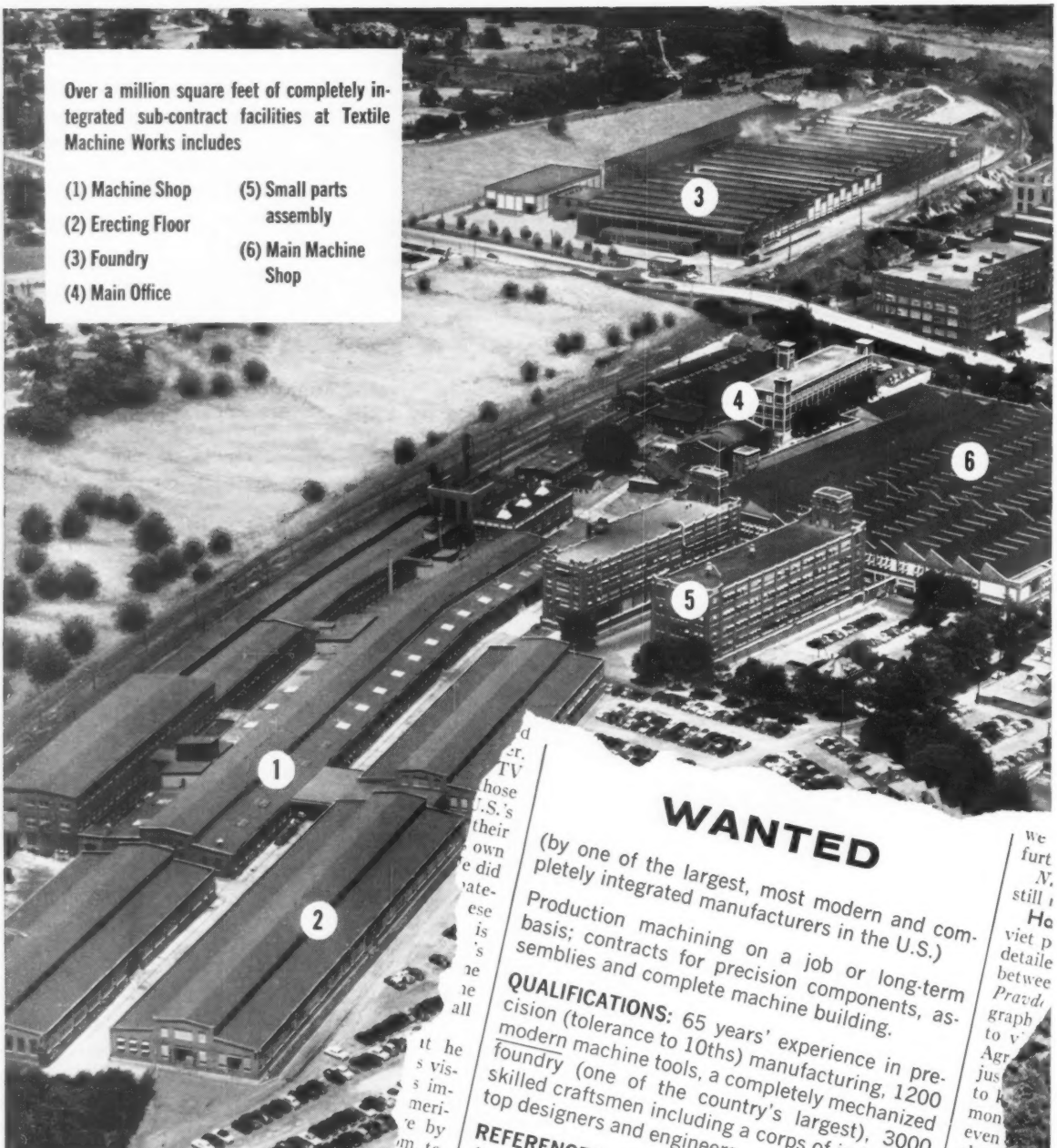
To manufacture quality, precision-made rings at low cost on a mass-production basis, Keystone specially-developed copper coated annealed-in-process Forming Wire is used. Its superior quality and constant uniformity result in a perfectly aligned and nickel-plated ring.

Keystone wire for Loose Leaf Metals Co.'s "Perfection" binder rings must have the correct temper so the wire can be rolled into oval shape prior to being formed into rings, then cut, swedged and deburred. In addition, the clean brite finish of Keystone Forming Wire provides a base for successful nickel plating.

The combination of Keystone experienced wire engineering, plus constantly improved marketing techniques of Loose Leaf Metals have resulted in greatly increased production of binder hardware at lower costs.

Perhaps Keystone Wire Specialists can solve your wire problems, too. Call your nearest Keystone representative, or write us for details. *Keystone Steel & Wire Company, Peoria, Illinois*

KEYSTONE
WIRE FOR INDUSTRY



WANTED

(by one of the largest, most modern and completely integrated manufacturers in the U.S.)

Production machining on a job or long-term basis; contracts for precision components, assemblies and complete machine building.

QUALIFICATIONS: 65 years' experience in precision (tolerance to 10ths) manufacturing, 1200 modern machine tools, a completely mechanized foundry (one of the country's largest), 3000 skilled craftsmen including a corps of industry's top designers and engineers.

REFERENCES: The best . . . companies like Alcoa, Du Pont, Chrysler, Eastman Kodak, Western Electric, Fairchild Aircraft, Ingersoll-Rand and others who know they can depend on TMW for quality, accuracy and on-time delivery at minimum costs.

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TEXTILE MACHINE WORKS
CONTRACT DIVISION, READING, PENNA.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va., W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
CrawfordsvilleInd. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

	An'ld Galv. Stone	Stone
WIRE (16 gage)		
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....
WIRE, Merchant Quality (6 to 8 gage)	**An'ld Galv.**	
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville.Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48) S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
SparrwsPt.(48) B2	9.10	9.775§
St'ling(37)(48) N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass. A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packages	43.75
Bulk	50

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:

Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread: Through 1 in. diam., 6 in. and shorter:

Packages	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in., larger 12.85 ⅞ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅝ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Del. in mill zone, 5.40c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 1⅜ in. and smaller rounds, 9.65c, over 3⅛ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1¼		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	30.00	42.25	44.50	40.00	40.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.80	44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Minimum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except; Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no change.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.27	8.66	10.06	....	8.28	8.95	11.80	16.38	9.53	8.84	10.43
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	9.87	11.22	11.34	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.98	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.43	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	10.03	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.59	11.29	12.20	61.27	11.29	9.67	14.20	17.35	10.54	9.82	11.79
Memphis, Tenn.	9.84	10.05	....	....	11.24	9.92	12.74	....	10.33	10.12	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	9.24	10.70	11.45	....	10.90	9.34	11.15	16.45	9.83	9.17	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.85	10.00	10.89	52.71	10.85	9.25	11.95	16.38	9.45	9.20	10.45
Pittsburgh	8.57	9.98	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	10.20	12.05	12.35	....	12.20	10.20	16.65	17.80	10.80	10.35	12.50
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.45	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. x 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ¾ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85§
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe	36.75, ton, del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500-lb drum freight allowed, c.l.	39.80; ton lots 41.80
Brass, 80/20, leaded (60 mesh)	39.90
Bronze, filter powder, 90/10	47.00*
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	$1.00
Nickel	$0.95-$1.15
Nickel-Silver	61.70
Solder	15.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	25.90
Tungsten:	Dollars
Carbon reduced, 98.8% min., minus 65 mesh	nom.**
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.75	$5.65	$5.65	$5.50	$5.85
Bar Size Angles	5.85	5.75	5.75	5.60	5.95
Structural Angles	5.65	5.55	5.55	5.40	5.75
I-Beams	5.60	5.50	5.50	5.35	5.70
Channels	5.60	5.50	5.50	5.35	5.70
Plates (basic bessemer)	6.00	5.90	5.90	5.75	6.10
Sheets, H.R.	Nom.	Nom.	Nom.	Nom.	Nom.
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	Nom.	Nom.	Nom.	Nom.	Nom.
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	Nom.	Nom.	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.70	25.14	24.85	24.85	26.02
Barbed Wire (†)	6.25	6.15	6.15	6.00	6.35
Merchant Bars	5.85	5.75	5.75	5.60	5.95
Hot-Rolled Bands	6.20	6.10	6.10	5.95	6.30
Wire Rods, Thomas Commercial No. 5	6.40	6.35	6.20	6.20	6.60
Wire Rods, O. H., No. 5	6.55	6.50	6.35	6.35	6.70
Bright Common Wire Nails (‡)	7.50	7.40	7.40	7.00	7.60

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports 23.00†
Chilean, 72-75%, c.i.f. Atlantic ports .. 22.00
Brazilian, 68.5%, f.o.b. vessel, Victoria, per ton $11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality $19.75-20.00
Domestic, concentrates, f.o.b. milling points 22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 ..... $34.00-35.00†
48% no ratio ..... 25.00-26.00†

South African Transvaal

44% no ratio ..... 18.75†
48% no ratio ..... 24.00-26.00†

Turkish

48% 3:1 ..... 36.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60% $2.50-2.80
60-65% 2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

†Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va., Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload ,lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANINUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti.; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37. f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5-8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max., 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 31.50c per lb contained Cr.; 0.010% max, 32.50c. Delivered.

Cr, 67-71%, carload, lump, bulk, 0.025% max, 34.50c; 0.05% max, 33.50c; 0.10% max, 33.25c; 0.20% max, 33.00c; 0.50% max, 32.75c; 1.0% max, 32.50c; 1.5% max, 32.25c; 2.0% max, 32.00c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). SM x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr. 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr., 14.60c per lb contained Si; 0.75 in. x down, 29.40c per lb contained Cr., 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland. Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (CB 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Export Sales Prop Scrap Market

Continued active demand for tonnages needed abroad is main support of market in absence of any important sales to domestic mills. STEEL's composite holds at $32

Scrap Prices, Page 136

• **Chicago** — Despite a slightly weaker price tone in the scrap market, unconfirmed reports are circulating of mill buying of a few open hearth grades at $1 a ton above the previous week's level. Contributing to the softer tone is the fact that the district steelmaking rate continues static, and optimism for any great rise in September is waning.

Plenty of scrap is available, and brokers find it is easier to cover on their requirements than it was a few weeks ago when there was a prospect of an upturn in steelmaking during August.

• **Pittsburgh**—Prices paid for New York Central and B&O railroad scrap were about the same as last month's. Dealers were disappointed because they had hoped that the recent $2 advance by factory bundles marked the start of a market upswing. Wheels dropped $3.40 a ton to $46, ending a short-lived speculative boom.

Buyers for one of the district's major consumers have indicated that they will not purchase any more scrap this year unless their furnaces are operated at 85 to 90 per cent of capacity.

• **New York**—Export trading continues to dominate the scrap market here. Foreign sales are brisk and in sharp contrast with the rate of domestic buying. Brokers' prices are unchanged.

• **Philadelphia**—Scrap prices are unchanged. With domestic demand dull, the market for steelmaking grades is bolstered by continued active export business. Some sellers look for a strong demand from abroad through September.

Domestic consumers are buying in small lots on a hand-to-mouth basis.

• **Cleveland** — In a dull market, prices held unchanged with the exception of cut foundry steel. The grade moved $2 higher on a sale to an important local user. No. 1 heavy melting railroad scrap advanced 50 cents a ton in the Valley to $34.50-$35 on a recent New York Central transaction.

• **Buffalo**—A leading consumer in this area has placed orders for mill scrap at about the same prices prevailing in July. The mill purchased No. 1 heavy melting at $30, No. 2 bundles at $22, and short shoveling turnings at $17. The tonnages involved were fair, considering the current low rate of mill operations.

Several of the higher priced specialty items have backed off around $2 a ton due to limited demand.

• **Toledo, Ohio**—A shipment of 150 tons of stainless steel scrap, first of its kind to leave Toledo, was loaded

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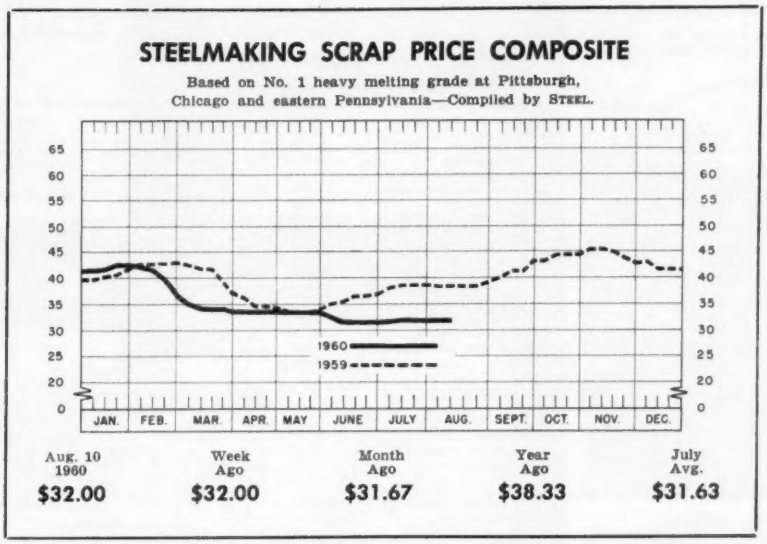

here aboard the freighter *Skogsholm*. The nickel-chrome alloy scrap is destined for Rotterdam. It comes from the Home City Iron & Metal Co., Springfield, Ohio.

• **Milwaukee**—During the ten days ended Aug. 12, almost 14,000 tons of scrap were loaded by Lincoln Iron & Steel Co., this city, for shipment to Germany—a record for this port for such a short period.

• **Cincinnati**—The scrap market remains extremely dull. Prices based upon limited mill buying are too low to budge scrap from dealer yards. The undertone is strong, based on the belief that the bottom has been reached and that steelmaking rates will show a September upturn.

• **St. Louis**—Only minor upward adjustments in prices were posted last week, but the undertone of the market is firmer. Strong resistance of mills to any major rise at this time is evident. Mills are still working off inventories and refuse to bid for material at the asking levels.

• **Houston**—A major Japanese cartel has announced it will be oversupplied with steel scrap by September and will cease buying at that time. The impending loss of a big chunk of the Japanese market jolted the Gulf Coast area.

Domestic price levels have been supported by exports and Japan has been the heaviest buyer. A typical cargo from Houston contains 40 per cent No. 1 heavy melting steel, 40 per cent No. 2 heavy melting, and 20 per cent No. 2 bundles.

• **Birmingham** — Scrap prices on most of the steelmaking grades moved higher last week. The market is quoted $29 to $30 on No. 1 heavy melting, $32 to $33 on No. 1 bundles, $21 to $22 on No. 2 bundles, and $31 to $32 on No. 1 railroad heavy melting. An interesting development: Some buyers are placing combination sales under which they pay a premium for bundles and get No. 1 heavy melting at a price below the quoted market.

• **Los Angeles**—Dealers in this district have made a drastic change in the basis for quoting scrap prices. Due to the small tonnages moving into domestic consuming channels, they are basing their price schedules on material to be shipped abroad. Foreign sales amount to 75 or 80 per cent of local scrap business. Prices to domestic mills had been lower than those quoted to exporters as dealers tried to encourage domestic buying. On the new basis, No. 1 heavy melting is quoted $35 to $37; No. 2 heavy melting, $33 to $35; No. 1 bundles, $35 to $36; and No. 2 bundles, $22 to $23.

Pig Iron . . .

Pig Iron Prices, Page 131

Consumption of pig iron continues slow, resulting in a further curtailment of production. In the Buffalo district, for instance, only eight of 16 blast furnaces are active. Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., shut down a blast furnace at Tonawanda, N. Y. This plant has built up enough iron inventory to take care of its open hearth needs as well as needs of the merchant market.

Youngstown Sheet & Tube Co. relighted its No. 2 blast furnace at Indiana Harbor, Ind., Aug. 2. Of the Chicago district's 43 stacks, 22 are active.

Wheeling Steel Corp. has taken out of service the No. 1 blast furnace at its Steubenville (Ohio) Works for a major rebuild and capacity increase project. Cost: More than $3 million. New equipment to be installed includes a turboblower with a blowing capacity of 110,000 cfm. The project is expected to require about six months to complete.

The furnace has produced more than 2.25 million tons of pig iron since it was last relined in 1952, says H. Nelson Lang, general manager, Steubenville Works.

During the balance of this year, an increased portion of iron tonnages for New England consumers will be supplied by Buffalo and Troy, N. Y., furnaces. Bulk of the Buffalo iron will come from storage at Beacon, N. Y. Freight rates continue to be adjusted. The rate from Troy to Claremont, N. H., has been reduced to $5.68 a gross ton from $7.18, minimum weight of 28 tons. For 50 ton shipments, the rate is $5.11.

Distributors . . .

Prices, Page 131

Steel service centers report a continued lag in business, although they anticipate some improvement over the next few weeks. Optimism is based on the fact that fewer consuming plants are closed for vacations and unbalanced stocks are causing some consumers to place larger orders with jobbers for urgent needs.

One large steel service organization observes that sales through June were about 15 to 20 per cent below the corresponding period of 1959. Service centers which were closed during last year's steel strike may find total 1960 business somewhat

(*Please turn to Page* 141)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Aug. 10, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Aug. 10	$32.00
Aug. 3	32.00
July Avg.	31.63
Aug. 1959	38.64
Aug. 1955	43.97

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	25.00-26.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	30.00-31.00
No. 1 factory bundles	37.00-38.00
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Short turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	*37.00-38.00*
3 ft and under	*36.00-37.00*
Heavy turnings	27.00-28.00
Punchings & plate scrap	39.00-40.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	34.00-35.00
Unstripped motor blocks	25.00-26.00
Clean auto cast	37.00-38.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	*47.00-48.00*
Rails, rerolling	*53.00-54.00*

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	*28.00-29.00*
No. 1 factory bundles	37.00-38.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	20.00-21.00
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	*15.00-16.00*
Mixed borings, turnings	*17.00-18.00*
Shovel turnings	*17.00-18.00*
Cast iron borings	*17.00-18.00*
Cut structurals, 3 ft	35.00-36.00
Punchings & plate scrap	37.00-38.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	36.00-37.00
Unstripped motor blocks	34.00-35.00
Clean auto cast	47.00-48.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
R.R. malleable	46.00-47.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	43.00-44.00
Axles	*53.00-54.00*
Rails, rerolling	*53.00-54.00*

Stainless Steel Scrap

18-8 bundles, solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	14.00-15.00
No. 1 bundles	29.00-30.00
No. 2 bundles	15.50-16.50
No. 1 busheling	25.00-26.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	9.00-11.00
Shovel turnings	8.00-9.00

Cast Iron Grades

No. 1 Cupola	36.00-37.00
Stove plate	30.00-31.00
Heavy breakable	30.00-31.00
Unstripped motor blocks	22.00-23.00
Charging box cast	30.00-31.00
Clean auto cast	43.00-44.00

CLEVELAND

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	23.00-24.00
No. 1 factory bundles	34.00-35.00
No. 1 bundles	31.00-32.00
No. 2 bundles	17.00-18.00
No. 1 busheling	31.00-32.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	*34.00-35.00*
Cut structurals, plate 2 ft and under	39.00-40.00
Low phos. punchings & plate	31.00-32.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	33.00-34.00†

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	33.00-34.00
Heavy breakable cast	30.00-31.00
Stove plate	39.00-40.00
Unstripped motor blocks	32.00-33.00
Brake shoes	35.00-36.00
Clean auto cast	50.00-51.00
Burnt cast	40.00-41.00
Drop broken machinery	50.00-51.00

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Rails, random length	44.00-45.00
Cast steel	38.00-39.00
No. 1 railroad cast	46.00-47.00
Railroad specialties	44.00-45.00
Angles, splice bars	46.00-47.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	175.00-180.00
18-8 turnings	75.00-80.00
430 clips, bundles, solids	90.00-95.00
430 turnings	20.00-30.00

YOUNGSTOWN

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	25.00-26.00
No. 1 busheling	33.00-34.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	35.00-36.00
Electric furnace bundles	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	*34.50-35.50*

BUFFALO

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00†
No. 1 bundles	29.00-30.00
No. 2 bundles	21.00-22.00
No. 1 busheling	29.00-30.00
Shovel turnings	*16.00-17.00*
Machine shop turnings	12.00-13.00
Cast iron borings	*14.00-15.00*
Low phos. structurals and plate, 2 ft and under	*37.00-38.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	40.00-41.00
No. 1 machinery	47.00-48.00

Railroad Scrap

Rails, random lengths	*41.00-42.00*
Rails, 3 ft and under	*47.00-48.00*
Railroad specialties	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.50-27.50
No. 2 heavy melting	22.50-23.50
No. 1 bundles	26.50-27.50
No. 2 bundles	17.50-18.50
No. 1 busheling	26.50-27.50
Machine shop turnings	10.00-11.00
Mixed borings, turnings	10.00-11.00
Shovel turnings	12.00-13.00
Cast iron borings	12.00-13.00
Low phos. 18 in.	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	35.00-36.00
Heavy breakable cast	31.00-32.00
Charging box cast	35.00-36.00
Drop broken machinery	48.00-49.00

Railroad Scrap

No. 1 R.R. heavy melt.	*32.00-33.00*
Rails, 18 in. and under	51.00-52.00
Rails, random lengths	43.00-44.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	36.00
No. 2 bundles	20.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	17.00†
Shovel turnings	21.00
Machine shop turnings	15.00
Heavy turnings	28.00†
Structurals & plates	38.00-40.00
Couplers, springs, wheels	40.00
Rail crop, 2 ft & under	51.00-52.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	38.00
Drop broken machinery	50.00
Malleable	46.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	8.00-9.00†
Shovel turnings	9.00-10.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	30.00-31.00

Stainless Steel

18-8 sheets, clips, solids	165.00-170.00
18-8 borings, turnings	80.00-85.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	24.00-24.50
No. 2 heavy melting	19.00-20.00
No. 1 bundles	24.00-24.50
No. 1 busheling	24.00-24.50
Machine shop turnings	6.00-7.00
Shovel turnings	8.50-9.00
No. 1 cast	39.00-40.00
Mixed cupola cast	33.00-33.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling	31.00-32.00
Cast iron borings	*10.00-11.00*
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	35.00-36.00
Structurals & plate	35.00-36.00
Electric furnace bundles	32.00-33.00
Electric furnace:	
3 ft and under	31.00-32.00
2 ft and under	32.00-33.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Stove plate	46.00-47.00
Unstripped motor blocks	35.00-36.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	39.00-40.00
Angles, splice bars	39.00-40.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	31.00
No. 2 heavy melting	28.00
No. 1 bundles	33.00
No. 2 bundles	19.00
No. 1 busheling	33.00
Machine shop turnings	9.00
Shovel turnings	11.00

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	36.00
Heavy breakable cast	*34.00*
Unstripped motor blocks	36.00
Clean auto cast	44.00
Stove plate	36.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00
Rails, random lengths	37.00
Rails, rerolling	*49.00*
Rails, 18 in. and under	41.00
Angles, splice bars	41.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	31.00
No. 2 heavy melting	29.00
No. 2 bundles	18.00
Machine shop turnings	11.00-12.00
Low phos. plate & structurals	38.00-39.00

Cast Iron Grades

No. 1 cupola	*34.00-34.50*
Heavy breakable	*25.00*
Foundry malleable	31.00†
Unstripped motor blocks	*28.00-28.50*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00

LOS ANGELES

(For export)

No. 1 heavy melting	*35.00-37.00*
No. 2 heavy melting	*33.00-35.00*
No. 1 bundles	*35.00-36.00*
No. 2 bundles	*22.00-23.00*
Machine shop turnings	*17.00-21.00†*
Shovel turnings	*17.00-20.00†*
Cast iron borings	*17.00-20.00†*
Cut structurals and plate 1 ft and under	*44.00-46.00*

Cast Iron Grades

No. 1 cupola	*45.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00†*

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	35.00-38.00
No. 2 heavy melting	32.00-35.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	33.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	38.50
No. 1 hvy (unprepared)	35.00
No. 2 heavy melting	35.50
No. 2 hvy (unprepared)	33.00
No. 2 bundles	23.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	36.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	25.80
No. 2 hvy, melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

†Nominal.

‡F.o.b. Hamilton, Ont.

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THE SIZE
OF YOUR FURNACE
OR THE
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Copper Companies Map Chilean Expansion

KENNECOTT COPPER CORP. and the Anaconda Co. are mapping a huge expansion in Chile that could add thousands of tons to Free World copper capacity. Talks with Chilean officials may be nearing the climax, hint informed metalmen.

• **Want Stable Taxes** — The one stumbling block, and it's a big one, is a meeting of the minds on taxation. Chile taxes the copper companies according to production—at low output, taxes go up; as production rises, taxes come down. Currently, Anaconda is being taxed at a rate of about 60 per cent of gross profit, Kennecott at 75 per cent.

Before sinking more funds into expansion, the two companies are reported to be seeking a firm commitment from the Chilean government. On present facilities, they want tax escalation to be halted for 20 years, plus a lower rate on new facilities. They also want a guaranty of stability of currency exchange, say observers.

• **Type of Expansion** — Kennecott announced earlier in the year it was thinking of adding 100,000 tons to its Chilean production (now 180,000 tons yearly). Anaconda has made no official announcement of what direction its expansion would take, but it's believed a large chunk of it would go to build a refinery.

The lag between start of construction and the first shipments of copper from the new facilities will be several years. Metalmen believe that the world market wouldn't be overburdened because of increasing industrialization, particularly in Western Europe where the bulk of Chilean copper usually goes.

In the Markets

• **Aluminum Makers Concur** — Other aluminum producers have quietly followed the lead of Aluminum Co. of America and bumped prices on mill products and certain specialized alloy ingots (see STEEL, Aug. 8, p. 144). Increases range from 2 mills to 2 cents a pound, says Reynolds Metals Co. The other producers have also followed Alcoa's lead in dropping the term "pig" for "ingot." The Canadian producer, Aluminium Ltd., followed the domestic producers in the change of terminology.

• **Zinc Buyers Hold Back**—Better demand for high grade and special high grade zinc should make August a better month than July, but sales are still on the slow side. In July, shipments of slab zinc hit 54,381 tons compared with 54,075 tons in June, reports the American Zinc Institute Inc. Producers' stocks went to 207,059 tons, a 19,373 ton increase. Production decreased for the fourth consecutive month.

Slack Sales, Imports, Strikes Weaken First Half Earnings

	1960	1959
Aluminum Co. of America	$21,726,308	$28,936,333
Reynolds Metals Co.	13,218,000	20,609,000
Kaiser Aluminum & Chemical Corp.	11,737,000	13,222,000
Kennecott Copper Corp.	42,660,746	47,760,000
Phelps Dodge Corp.	17,943,433	26,697,606
Inspiration Consolidated Copper Co.	2,554,718	3,204,941
Revere Copper & Brass Inc.	3,831,305	5,306,453
Mueller Brass Co.	13,410	761,386
St. Joseph Lead Co.	2,504,963	3,626,343
American Smelting & Refining Co.	13,998,400	6,907,400
American Zinc, Lead & Smelting Co.	770,483	484,172
National Lead Co.	25,296,609	26,811,790

WITH few exceptions, first half earnings in the nonferrous industry dipped below those of the corresponding period of 1959. Reasons are mixed, but most companies had a slump in sales.

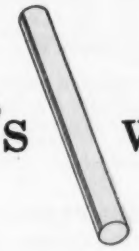
While the aluminum industry's volume wasn't off too much (an estimated 4 to 6 per cent), the combination of higher costs and some pretty severe price slashing combined to lower earnings.

Brass mills suffered from severe price cutting as domestic producers moved to compete with imported materials. While imports haven't gone up in volume this year, they've taken a bigger percentage share of domestic business which has been hurt by the general slowdown in the economy.

Lead and zinc suffered from a slump in demand.

Anaconda Memo to Management

This is a penny's worth of bronze



It's a piece of Anaconda welding rod that could be worth its weight in gold to you. It might save you a big capital investment or important production time by salvaging equipment that seems beyond repair. Take the experience of Jessop Steel Co., for example. A while back their production stopped dead in its tracks when the 60-ton semisteel base of a big forging hammer fractured. A replacement base? Of course—in nine months. Jessop called specialists in repairing heavy machinery. The base was repaired by braze welding in a week —at 20% of replacement cost. About a ton of Tobin Bronze®-481 rod was used. But sometimes a few ounces can make equally significant savings in building up worn surfaces or repairing a broken part that has immobilized a big machine. *And don't overlook braze welding in production.* It's a practical way to get flexible, low-cost production assembly of tubular and sheet steel products —like furniture and appliances. American Motors uses it to add strength, prevent squeaks, leaks, and rattles in unit construction of the Rambler's body, supplementing electric welding in some 30 areas. Anaconda-997 (Low Fuming) Bronze Rod has proved to be the best welding rod for these production uses.

6060 Rev.

We'd be glad to send you (or anyone else in your company) a copy of Publication B-13 which gives detailed and practical information on Anaconda Welding Rods in repair and production jobs. If you have a special problem, the services of an Anaconda specialist are at your disposal. Write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA®

WELDING RODS

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 30.70; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; five refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb f.o.b. Minneapolis; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $210-212 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $45-50 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 103.75.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.35-4.50.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys 26.25-28.00; No. 12 foundry alloy (No. 2 grade), 23.75-24.25; 5% silicon alloy, 0.60 Cu max., 25.00-25.25; 13 alloy, 0.60 Cu max., 25.00-25.25; 195 alloy, 26.75-27.75; 108 alloy, 24.25-24.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 23.75; grade 3, 22.75; grade 4, 22.25.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.80-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075 T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft

Diam.	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.60
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.00-23.50; No. 2 heavy copper and wire, 20.00-20.50; light copper, 18.00-18.50; No. 1 composition red brass, 17.00-17.25; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 30.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	50.00b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	26.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48 68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.50-15.75; new brass clippings, 14.00-14.50; light brass, 10.50-10.75; heavy yellow brass, 11.50-11.75; new brass rod ends, 12.50-12.75; auto radiators, unsweated, 12.50-12.75; cocks and faucets, 13.50-14.00; brass pipe, 14.00-14.50.

Lead: Soft scrap lead; 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 6.50-7.00; segregated low copper clips, 14.00-14.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 11.50-12.00; clean borings and turnings, 8.00-8.50; segregated low copper clips, 16.00-16.50; segregated high copper clips, 14.50-15.00; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00-11.25; clean borings and turnings, 9.50-10.00; segregated low copper clips, 14.75-15.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 27.75; No. 2 heavy copper and wire, 26.00; light copper, 23.50; refinery brass (66% copper) dry copper content, 23.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.75; No. 2 heavy copper and wire, 26.00; light copper, 23.50; No. 1 composition borings, 21.00; No. 1 composition solids, 21.50; heavy yellow brass solids, 16.50; yellow brass turnings, 14.50; radiators, 17.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.
Copper: Flat-rolled, 50.04; oval, 46.50, 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 1000 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.
Tin: Bar or slab, less than 200 lb, 122.50; 200-499 lb, 121.00; 500-999 lb, 120.50; 1000 lb or more, 120.00.
Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.50 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.
Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.
Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.
Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.
Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.
Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.
Sodium Stannate: Less than 100 lb, 80.60; 100-600 lb, 71.20; 700-1900 lb, 68.40; 2000-9900 lb, 66.60; 10,000 lb or more, 65.20.
Stannous Chloride (Anhydrous): 25 lb, 156.20; 100 lb, 151.40; 400 lb, 148.90; 800-19,900 lb, 108.00; 20,000 lb or more, 102.00.
Stannous Sulphate: Less than 50 lb, 141.30; 50 lb, 111.30; 100-1900 lb, 109.30; 2000 lb or more, 107.30.
Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 135)

larger than the 1959 volume; those which remained open during the strike probably will end this year with bookings behind those of 1959.

Tubular Goods . . .

Tubular Goods Prices, Page 130

Demand for tubular products continues bullish, but there are indications that spot shortages are developing. Even though users have ample inventories from an over-all tonnage standpoint, they're running short of certain grades and sizes.

Standard pipe jobbers have sold most of their surplus stocks and are ordering enough steel to replace tonnage shipped to customers. Line pipe sales are on the upswing as gas transmission companies expand their distribution systems.

The Federal Power Commission has authorized Pacific Gas Transmission Co. to build a pipeline from the Canadian-Idaho border to the Oregon-California border. Approval now is needed from the California Public Utilities Commission to complete the line from Oregon to Antioch, Calif., near San Francisco. The project will cost $340 million and will involve 1400 miles of 36 in. pipe.

Texas Eastern Transmission Corp., Houston, will start construction soon on an 89 mile, petroleum products pipeline (10 in. diameter) between Lebanon and Lima, Ohio, to connect the Little Big Inch system with the Buckeye Pipe Line system. The joint venture will open vast new markets in the Ohio-Michigan area to Gulf Coast oil refiners.

Mills in the Far West expect foreign competition to continue, but it has eased because of delays in getting German tubular goods from overseas. This has forced many consumers to return to the domestic market.

Structural Shapes . . .

Structural Shape Prices, Page 124

Structural demand is a little livelier, due primarly to public work, especially bridges. Most designs in New England are for composite, wide flange beam and stringer construction with a minimum of shopwork. Low backlogs and early shipment of plain material assures delivery of fabricated structures well within completion specifications.

Since fabricators are beginning to build up backlogs somewhat, they are not competing quite as sharply as they did a month ago. Standard and wide flange shapes can be had within two to four weeks.

Following action by U. S. Steel Corp., Bethlehem Steel Co. and other leading producers have added a charge of 0.05 cent a pound over the base price for carbon structurals and bars made under newly approved ASTM Specification A36.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

11,500 tons, Bruckner Boulevard Cross Bronx Expressway, New York, through Gull Contracting Co., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

8000 tons, office building, New York Life Insurance Co., Madison Avenue, between 27th and 28th streets, New York, through Turner Construction Co., to Grand Iron Works, that city.

4450 tons, industrial plant, W. S. Tyler Co.,

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IF YOU OPERATE A FURNACE . . . . .

We will purchase your scrap linings, retorts, conveyors, muffles, racks, etc. Any item made of Nickel alloy.

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Permanent positions with Arthur G. McKee & Company at their Cleveland offices for **ENGINEERS, DESIGNERS, DRAFTSMEN** who are experienced in any type of Steel Plant or Steel Plant Equipment design. Applications will be kept confidential.

Send detailed resume and photo to:

G. VICTOR HOPKINS

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Help Wanted

Wanted: GENERAL SUPERINTENDENT—For malleable iron foundry. Applicant must have had experience in production shop. Metallurgical background desirable. Please state age and experience in reply. Must be familiar with malleable iron gating, molding technique, etc. Reply Box 865, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

STRUCTURAL SUP'T — Available Sept. 1. Thorough knowledge of bridge and building fabrication and shop procedures. 23 years experience. Reply Box 864, STEEL, Penton Bldg., Cleveland 13, Ohio.

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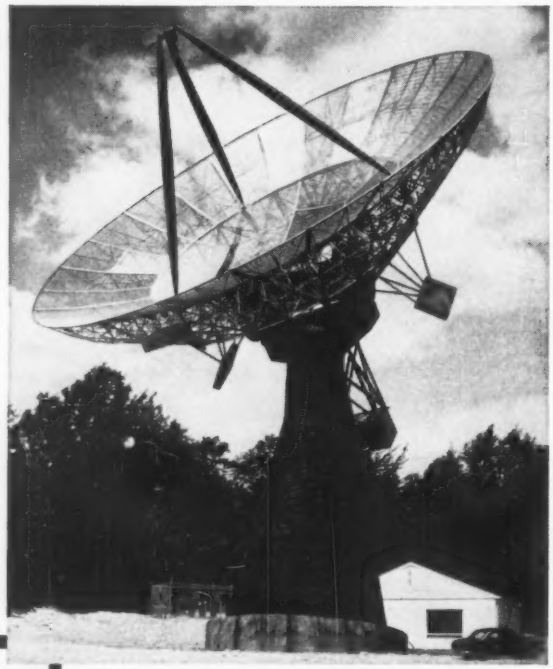

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It takes real accuracy in gearing to turn an 84-ft. radio telescope at that speed. Backlash on the Cone-Drive **double-enveloping worm** gear set used in the complex drive system was held to 0.0012-inch.

Dependable Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

Mentor, Ohio, to Kilroy Structural Steel Co., Cleveland.

4100 tons, addition to LaGuardia airport facilities, New York, through Turner Construction Co. to Grand Iron Works, that city.

900 tons, including 300 tons of joists, addition, Reading Tube Co., Reading, Pa., to Pollack-Mayer Inc., Pottstown, Pa.

406 tons, state bridgework, LR 774-1, Cumberland County, Pennsylvania, to Phoenix Bridge Co., Phoenixville, Pa.

400 tons, warehouse and packaging center, Avon Products Inc., Newark, Del., to Pilgrim Steel Co.

237 tons, bridge, FAI Route 55, Section 99-2HB4, Will County, Illinois, for state, to Vierling Steel Works, Chicago.

125 tons, bridge, FAI Route 55, Section 99-2HB2, Will County, Illinois, for state, to Vierling Steel Works, Chicago.

STRUCTURAL STEEL PENDING

9500 tons, steel piles, substructure, bridge, Route 95, Taunton River, Fall River-Somerset, Mass.; Dravo Corp., Pittsburgh, low, general contract, $7,197,555; also 650 tons, steel sheet piling.

4000 tons, Queens central repair shop, New York Department of Public Works, New York; bids Aug. 24.

2800 tons, housing development for New York City Housing Authority, West Brighton, New York; Wilaka Construction Co., New York, low on general contract.

2204 tons, state bridgework, Richmond County, New York; Rusciano & DelBallo, New York, low on general contract.

2000 tons, shipping terminal, 39th Street, Brooklyn, N. Y., New York Department of Marine & Aviation; Lasker-Goldman Inc., New York, low on general contract.

1996 tons, state bridgework, FALIE 60-2, Suffolk County, New York; bids Aug. 25.

1978 tons, state bridgework, FASH 60-6, Ulster County, New York; bids Aug. 25.

1750 tons, state bridgework, LR 798, Section 1-B, Washington County, Pennsylvania; Nello L. Teer Co., Durham, N. C., low on general contract.

1662 tons, state bridgework, LR 187, Section 10, Allegheny County, Pennsylvania; Ralph Myers Construction Corp., Pitcairn, Pa., low on general contract.

1505 tons, project for United States Army Corps of Engineers at Hartwell, Ga.; Johnson, Drake & Piper, Minneapolis, low on general contract.

1200 tons, plant, Mack Truck Co., Hagerstown, Md.; bids closed Aug. 8.

1030 tons, state bridgework, Columbia County, New York; Savin Bros., Wethersfield, Conn., low on general contract.

1014 tons, state bridgework, Broome County, New York; Savin Bros., Wethersfield, Conn., low on general contract.

550 tons, Public School No. 257, Brooklyn, N. Y.; indefinitely postponed.

550 tons, Public School No. 84, Manhattan, N. Y.; bids postponed until Aug. 18.

458 tons, state bridgework, FARC 60-138, Nassau and Suffolk Counties, New York; bids Aug. 25.

450 tons, state bridgework, FARC 60-13C, Monroe County, New York; bids Aug. 25.

447 tons, state bridgework, TAC 60-3, Niagara County, New York; bids Aug. 25.

324 tons, state bridgework, LR 288, Section 15-1, Fayette and Westmoreland counties, Pennsylvania; Adam Eidemiller Inc., Greensburg, Pa., low on general contract.

302 tons, state bridgework, Suffolk County, New York; Hendrickson Bros., Long Island, low on general contract.

270 tons, state bridgework, FARC 60-137, Monroe County, New York; bids Aug. 25.

140 tons, Trinity River bridge, Central Valley project, Calif.; bids Aug. 18, Bureau of Reclamation, Denver.

PLATES . . .

PLATES PLACED

440 tons, carbon hull plates, General Stores Supply, Navy, to C. Itoh & Co., New York.

210 tons, hull plates, General Stores Supply, Philadelphia, to the Colorado Fuel & Iron Corp., Claymont, Del.; also 620 tons, carbon steel sheets to Columbia-Geneva Steel Div., U. S. Steel Corp., San Francisco.

PLATES PENDING

1500 tons, Conowingo intake and terminal, Hartford County, Maryland; bids closed Aug. 10.

275 tons, two contracts, Benicia Arsenal, Calif.; bids in.

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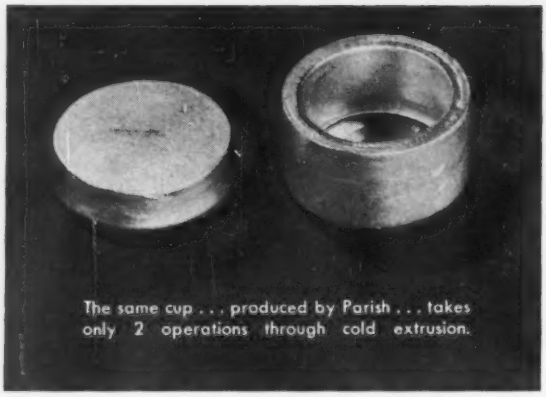

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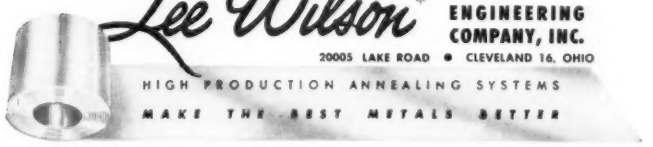

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